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On the Origin and Progress of Renal Surgery.

ON THE

ORIGIN AND PROGRESS

OF

RENAL SURGERY

WITH SPECIAL REFERENCE TO STONE IN THE KIDNEY AND URETER; AND TO THE SURGICAL TREATMENT OF CALCULOUS ANURIA

Being the Hunterian Lectures for 1898

TOGETHER WITH

A CRITICAL EXAMINATION OF SUBPARIETAL INJURIES OF THE URETER

BY

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PREFACE.

WHEN my colleagues in the Council of the Royal College of Surgeons did me the honour to appoint me Hunterian Professor of Surgery and Pathology for the year 1898, I had, in the first place, intended to give my personal experience of the several different renal affections which it has been my lot to treat surgically during the seventeen years which have elapsed since my first operation of nephrolithotomy. But when I came face to face with my task I found that to do so would necessitate a very cursory survey of a considerable number of subjects.

I therefore preferred to arrange in tabular form a brief abstract of 267 operations which I have performed upon the kidney up to the first week of March of 1898; and to limit the Lectures themselves to calculous disorders.

I have also collected a number of cases in which operations have been done for calculous anuria, and have devoted a large part of the third Lecture to that subject; feeling—and I believe rightly—that too little is known by the profession generally about this form of anuria, and still less about the advantages which the surgical treatment of it affords.

The first three Lectures and the Tables were prepared for the Hunterian Lectures; whilst Lecture four, written at the same time as the others, was published in the *Edinburgh*

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Medical Journal for January of this year; and is here reprinted, revised, and with additions.

I have to express my thanks to Dr. W. E. Wynter for valuable assistance in searching for, and verifying, numerous references; and for making abstracts from several foreign books and journals. To Dr. H. Campbell Thomson I am indebted for the great labour and pains he bestowed in tabulating the cases from my private and hospital note-books. To Mr. Berjeau for his clever drawings, and to Messrs. Butterworth for their skilful and careful execution of the woodcuts which illustrate these Lectures, my best thanks are also due.

8, Cavendish Square, W.
October, 1898.

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ON THE ORIGIN AND PROGRESS OF RENAL SURGERY.

LECTURE I.

ON THE ORIGIN AND PROGRESS OF RENAL SURGERY AND THE CONSERVATIVE TENDENCY OF ITS RECENT DEVELOPMENT.

MR. PRESIDENT AND GENTLEMEN,—In selecting the subject for the lectures, which by the grace of the Council I am about to deliver, I was influenced by the fact that "renal surgery," though it has attracted a good deal of attention amongst surgeons during the last twenty years, has not yet received the general recognition by the profession at large to which it is entitled; nor has it hitherto been the theme of any Hunterian professor.

I propose in this lecture to describe briefly the origin, and then to trace the progress, of this quite modern branch of surgery.

HISTORY.

In the sixteenth, seventeenth, and eighteenth centuries the practicability of nephrotomy was repeatedly discussed by Camerarius and François Rousset in 1581; by Shenck in 1584; Jean Duclédat and Cousinot in 1622; by Riolan also in the early part of the seventeenth century; by Von Hilden in 1646; then a century later by de Lafitte* in 1753, Borden in 1754, MM. Hévin and Ledran in 1757; and later still, namely, in 1829, it found a very ardent supporter in P. N. Gerdy,† the professor of anatomy and surgery in Paris, who, in a foot-note to his lectures on anatomy, to artists, refers at considerable length to the subject in all its aspects.

* Lafitte: "Sur les cas où la Nephrotomie defait avec succès." (Mém. de l'Acad. de Chir., ed. 1819, t. ii., p. 235.)

† Gerdy, P. N.: "Anatomie des Formes Extérieures du Corps Humain." Paris et Bruxelles, 1829. See a long foot-note on pages 150, 151, 152, 153, and 154.

As regards nephrectomy various physiological experiments upon animals were undertaken by Zambeccarius* about the year 1670, and Roonhuyzen† in 1672, to show that life could be well maintained after removing one of the kidneys.

Blancard‡ in 1690 expressed the opinion that extirpation of the kidney would give a fair prospect of success in patients suffering from renal calculi, and who could not obtain relief from any other treatment.

In the first years of the nineteenth century (1803) Comhaire§ was repeating the experiments of Zambeccarius with the object of proving that nephrectomy was possible.

Renal incisions are said to have been practised by Cossé,‖ by Jean Beverovicius and others, upon kidneys greatly distended with pus. The cases of the archer of Meudon, of the British consul at Venice, and others, which had found their way into surgical literature, may be dismissed in the words of M. Hévin,¶ who wrote in the year 1757, "it is very doubtful, if not absolutely improbable, that cutting into the kidney had ever been practised without the operation having been determined by an abscess swelling; or by a fistula due to renal abscess which had broken and discharged in the lumbar region."

None of these cases had any influence whatever in encouraging surgeons to operate upon the kidney; and no surgical treatment for any kind of renal disease was systematically employed until the second half of the present century had well advanced. As M. Le Dentu has said, it needed more than a century to overcome the interdiction of Hévin against incising the sound kidney. An interdiction which seemed to carry with it the force of law.

Nor can we regard the cases of unintentional excision of

* Zambeccarius: "Experimenta circa divers var. animal. viv. esset visc. et supplem." (act. nov. erudit Lipsiae), sect. 6, p. 275.

† Roonhuyzen: "Observ. Chir.," part i., obs. 22.

‡ Etienne Blancard: Article Nephrotomia, Lex. Med. Renovat. et Prax. Med., t. ii., cap. 13, pp. 252, 253.

§ Comhaire: "Dissertation on Extirpation of the Kidney" (Thèse, Paris, No. 85, 1803). Roy. Coll. Surgeons' Library.

‖ Cossé dans F. Collot: "Traité de l'Operation detaille."

¶ Hévin; "Researches, Historical and Critical, on Nephrotomy or Cutting into the Kidney," 1757. (Mém. de l'Acad. Roy. de Chirurgie, t. iii., part 2, sect. 2.)

the kidney (*i.e.* diseased kidneys removed on a wrong diagnosis and in ignorance of the nature of the tumour operated upon) as assisting in establishing nephrectomy as a recognised surgical procedure.

At least four of such mistaken operations had been performed before Simon's first nephrectomy; these were by Wolcott in 1861, Spiegelberg in 1867, Schnettelig (*Archiv f. Gynecologie*, 1871), and Peaslee in 1868.

All were followed by fatal results, and for this reason would not have been encouraging to Simon, even if he had known of them, which intrinsically it is not probable he did.

NEPHRECTOMY.

The dawn of renal surgery admittedly dates from the 2nd of August, 1869, when Gustav Simon of Heidelberg removed by the lumbar method the kidney of a woman who had a ureteral fistula opening upon the abdominal wall above the pubes, resulting from an ovariotomy done one year and a half before. Simon performed his operation in face of the pronouncement long before made by Rayer that it was "madness to dream of extirpating a kidney in the human subject." He no doubt was aware of the experimental results of Prévost and Dumas (1823), of Claude Bernard, Rayer, Meissner, and Shephard, all of whom established the fact that animals could live with only one kidney. For himself, he compared the results of fifteen hysterectomies with fifteen nephrectomies, practised on animals, and was satisfied that there was no more danger from a surgical point of view in the one operation than in the other; and at the same time he convinced himself that the physiological changes effected by the kidneys could be amply performed by one after the ablation of the other organ. The cynic might remark that the same fact had been verified over and over again in the *post-mortem* room in the bodies of persons who had lived with one kidney, the other having been absent or long ago atrophied; but that is not the same fact. What was wanted was the assurance that one kidney could do the work of both, after the shock of so severe an operation as nephrectomy.

These experiments on animals led Simon to resort to

nephrectomy in the human subject, and the result of his first operation upon woman justified his deductions drawn from experiments on animals.

Rather more than a year after Simon's case, Gilmore, in America, followed (December, 1870) with a very successful nephrectomy for a painful shrunken fibrous kidney in a woman five months pregnant, and who recovered without a miscarriage. After this came Simon's second operation, performed in August, 1871, for calculous pyelitis, but the patient died of pyæmia on the twenty-first day.

Then came two fatal operations, one for painful kidney by Durham, and the other for calculous pyelitis by Peters, of New York, both in 1872. Next, two successful ones *for injuries*, by Brandt in 1873, and Marvaud in 1875. Next, four operations for *malignant disease*, two successful, namely, one by Langenbuch in 1875, and one by Jessop, of Leeds, in 1877; and two fatal, both by Kocher, in 1876 and 1877. In 1878 Martin followed with four successful nephrectomies for *painful floating kidneys*, and thus confirmed Simon's first experience and Brandt's result, namely, that a quite healthy kidney might safely be removed.

In England the first nephrectomy was performed by Arthur E. Durham on May 14th, 1872. The next, that just referred to by Jessop, and the third by Barker.

Barker, who had made himself thoroughly familiar with Simon's work, read two important papers before the Royal Medical and Chirurgical Society; one in March, 1880, the other in April, 1881. He therein tabulated all the nephrectomies done up to those dates, and thus brought the whole subject of extirpation of the kidney before the notice of British surgeons, who till then, for the most part, were quite unfamiliar with it.

In France, where the earliest and most ardent advocates of nephrotomy had lived, nephrectomy was, for several years, either neglected or opposed. It was not until May 20th, 1880, nearly eleven years after Simon's successful initiative, that M. Léon Le Fort practised the first nephrectomy done in France. This was performed on account of a very rare form of injury, namely, a penetrating wound by a knife, which completely divided the ureter.

NEPHROTOMY.

Nephrotomy is the operation which had received most consideration in past times, especially in its bearing on the treatment of renal calculus disorders; but it was not, in all probability, ever systematically put into practice until 1870. Previous to 1870 fluid swellings, believed to be of the kidney, had been punctured, and opened by the thermo-cautery; and perinephric abscesses had been incised through the loin.

On April 27th, 1869, three months before Gustav Simon's first nephrectomy, a paper was read by then Mr., now Sir, Thomas Smith, describing a method for exposing the kidney through the loin. This he recommended for diagnostic purposes, and for the extraction of a calculus, if of suitable size and shape and capable of removal through the renal pelvis; but not if fixed in the substance of the kidney, or if its removal entailed cutting into the normal secreting structure. Though the author had no actual case of his own to record, and advocated nothing more than had been recommended on several occasions during the two preceding centuries, there can, I think, be little doubt that his paper, coming when it did, influenced the minds of surgeons to a degree which previous similar suggestions had failed to do. In July of the same year (1869) Annandale, and in January, 1870, Spencer Wells (*Med. Times and Gazette*, January 8th, 1870), also wrote in favour of nephrotomy in some cases of renal calculus. These articles, together with Simon's success, were all factors leading up to the application of nephrotomy to a class of case for which no one had as yet, so far as our absolute knowledge goes, suggested it; namely, for cases of renal calculus in a kidney otherwise normal.

In 1870, Bryant performed nephrotomy for tuberculous pyonephrosis, but at too late a stage to save his patient; and in the same year Gunn and Durham each cut down *upon* the kidney; and Lente and Barbour each cut *into* the kidney; with the object of removing calculi, but none was found. All four patients recovered.

During the next ten years, 1870—1880, nephrotomy was done in some half-dozen cases (according to Dickinson's

tables*), in each of which there was a large pyonephrosis, more or less pointing at the loin; and in four of these, calculi were extracted.

NEPHROLITHOTOMY.

No further advance, however, was made in the operative treatment of renal disorders till February 11th, 1880, when I successfully removed a mulberry calculus weighing 31 grs. from the undistended, and to the naked eye quite normal, kidney of a young woman. The kidney was exposed through an oblique lumbar incision, and the stone reached and removed through the renal parenchyma.

At that time I was unfamiliar with the attempts of other surgeons except Durham, whose exploration of the kidney, however, was not a nephrotomy at all. Nor did I then know that the name nephrolithotomy which I suggested for the operation I had performed had been used by Hévin more than a hundred and twenty years previously. I was led to undertake the operation in this particular case by the extreme severity and persistency of the symptoms, and by the little fear I felt about hæmorrhage from the cut renal parenchyma, on account of my previous experience of the trivial and easily controlled bleeding from the cut surface of the liver in operating for hydatid tumours.

This case demonstrated for the first time that a stone could be removed safely by cutting freely upon it through a thick layer of renal tissue. It thus became the starting point of both the development and the *conservatism* of renal surgery, which I am persuaded will become more and more conservative in the future.

The second nephrolithotomy was performed in August, 1881, by the late Mr. Marcus Beck, who removed a calculus composed of uric acid and phosphates weighing 26 grs. through an incision in the renal substance. Then followed cases by Mr. Butlin, who extracted an oxalate of lime calculus weighing 60 grs. by scratching through the renal pelvis; by Mr. Bennett May, by myself, and other surgeons; and in the list of my operations for removal of renal calculus by nephrolithotomy I am able to show thirty-four operations with thirty-three recoveries and one death. These results disprove the

* "On Renal and Urinary Affections," vol. iii., pp. 984 *et seq.*, 1885.

supposed dangers of nephrolithotomy, and show the invalidity of the objections which in all previous times had been urged against the proposal to operate upon a kidney not already converted into a mere abscess sac.

NEPHROPEXY.

Fourteen months after the first nephrolithotomy Hahn of Berlin introduced an operation at first called nephrorrhaphy and afterwards, by the French writers, nephropexy, for fixing movable kidneys. This consisted in an incision alongside the sacro-lumbalis muscle (such as the old writers advised for nephrotomy and Simon had employed for nephrectomy) extending from the twelfth rib to the crest of the ilium. The quadratus lumborum was cut; and the fibro-fatty capsule was opened along the outer border of the kidney, and having been separated to some extent was dragged forcibly backwards into the wound along with the kidney. By means of six or eight catgut sutures this capsule was stitched into the wound, and the wound itself plugged with carbolic gauze.

In his account, published in July, 1881, Hahn describes two cases thus operated upon by himself in April of that year. The patients were both women, and recovered in four weeks with the kidneys as securely in their attached position as immediately after the operation.

This was an important advance, because it at once had the effect of putting a stop to nephrectomy for movable kidney which had been recommended and practised by Martin of Berlin in 1878. The importance of this step was indeed great, for it not only brought about the substitution of a safe operation for one which, at that time especially, was attended with a very high mortality, but it also saved healthy organs from being needlessly excised, and was applicable to both kidneys of the same person when both were movable and required fixing.

But Hahn's method had this drawback, that it was not always or permanently efficacious; whereas, of course, nephrectomy, though only capable of being employed for one kidney could not be followed by a return of symptoms.

The principle of Hahn's operation was perfect; what was wanted was the improvement of the technique. I never felt

confidence in this mode of fixation, and preferred to attach the kidney itself to the cut edges of the transversalis fascia and the aponeurosis of the transversalis muscle by means of three sutures dipped deeply into the posterior surface of the organ and running for from three-quarters of an inch to an inch in its substance. I have used various materials for sutures—stout catgut, kangaroo tendon, and silk, but now always employ fine silk. The accompanying figure will explain my method of inserting the sutures.

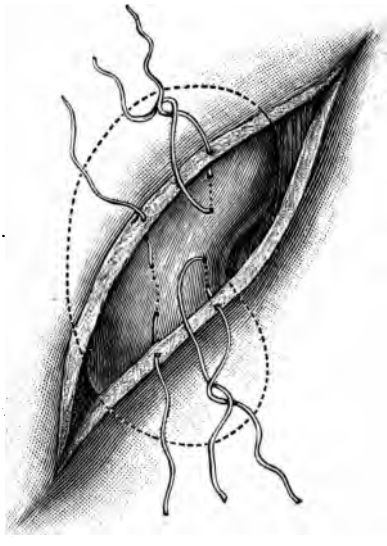


Fig. 1.—Author's method of fixing kidney. Left kidney shown.

The results obtained have in most of the cases been perfectly satisfactory, and I see from time to time patients upon whom I operated nine or ten years ago with their kidneys as firmly fixed as can be desired, and who have been quite free of their former symptoms ever since the operation. Moreover, I have had the opportunity of witnessing in the living bodies of some three or four of my patients the sound and complete holdfast which this method affords. It has a few times happened to me from six to twelve months or longer after fixing a hydronephrotic as well as after fixing the healthy kidney, to have to do a second operation for quite

different reasons upon the same organ: and I have then seen my sutures embedded in a mass of tough fibrous tissue, and have had to pull or cut them out from the renal parenchyma before I could detach the kidney. Here they had for months harmlessly remained without showing the least tendency to become the nuclei of calculi, as some surgeons anticipated would be the case.

M. Tuffier of Paris, whose admirable experimental work, published in 1889, on this and other branches of renal and ureteral surgery is well known, is of opinion that the parenchyma where the sutures constrict it, becomes sclerosed and atrophied. This condition did not appear to have been caused in the kidneys of the cases just referred to; but even if it had been, the amount of the kidney tissue so affected would be small, and could easily be spared without danger to the individual. Moreover, it would be less extensive than the superficial sclerosis which follows the plan which M. Tuffier himself advocates.

Tuffier, believing that the proper capsule of the kidney —smooth, thin, little resisting, avascular, and fibrous as it is— prevents the kidney itself from forming firm adhesions with the tissues and organs around it, recommends its partial decortication, and the suturing of the tunica propria to the edges of the parietal wound. This done, he thinks the parenchyma does not fail to attach itself firmly to the neighbouring tissues by the whole of the exposed area. The figures show two different ways by which he accomplishes this. Various modifications of Tuffier's method have been practised by different surgeons, but the principle of them all is to obtain direct adhesion between the bared parenchyma and the deep tissues of the abdominal wall; whether the capsule is detached in small squares, or in one large piece, or in many triangular slips, or is merely scarified.

A fourth method has more recently been suggested by M. Vulliet* of Geneva, and was first tried by his friend Poullet of Lyons. It consists in making use of a long slender slip of the tendon of the erector spinæ of the patient, as the means of fixation of the kidney. After exposing and freeing the

* *Vulliet:* "D'une nouvelle opération de nephropexie" (*Revue Médicale de la Suisse Romande*, 20 Juin, 1895, pp. 326 *et seq.*).

kidney in the usual manner, a separate short vertical incision, parallel with the spinous process of the first lumbar vertebra, is made through skin and fascia, and a tape-like slip of the tendon, about ten inches long and a quarter of an inch wide, is detached and pulled out through this little wound, but still left attached by its lower end to the muscle. This tendinous slip is to be the suture, and is passed through the muscular tissue, and having been made to underrun the capsule of the kidney, is then passed back again and fixed to the erector spinæ muscle. This is shown in the accompanying figure.

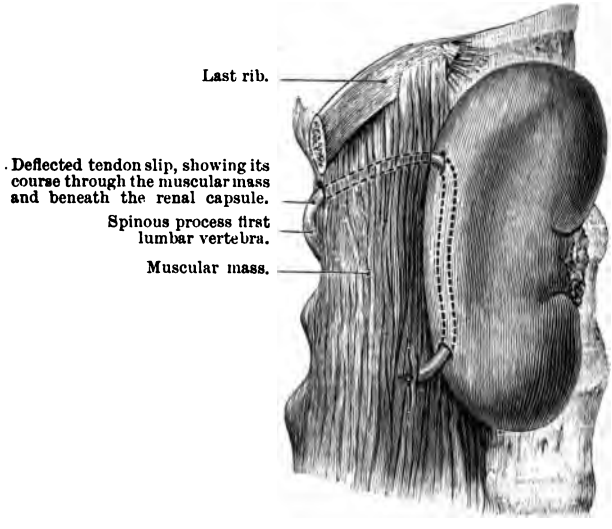


Fig. 2.—Vulliet's method of fixing kidney.

I have in some cases practised Tuffier's and, in others, Vulliet's method, but have found it requisite to modify the latter, because in many cases too short a length of the tendon is torn out. This modification consists in splitting the width of the detached tendon and passing each half separately through the torn muscles down to the kidney. Having underrun the kidney with one length of the tendon this length is then tightly tied to the other length. The kidney is thus slung by the tendon, the split ends of which may, if desired, be passed back through the torn muscles and fixed to the sheath

of the erector spinæ. I prefer Vulliet's method to Tuffier's, but that neither is so simple, or so rapidly done, or more efficacious than my own.

PARTIAL EXCISIONS.

Another most important advance in the conservatism of the surgery of the kidney is the excision of diseased portions of the organ in place of nephrectomy. This step was a natural result of the establishment of nephrolithotomy as a sound surgical procedure. The fear of uncontrollable bleeding during the operation, and the doubts as to the healing power of a kidney when cut into or otherwise wounded being once removed, the attempt to save the greater part of the organ, when only a small portion was diseased or injured, was bound to be made.

Tuffier's experiments on animals in 1888, and Barth's histological researches, supply ample proofs of the healing power of the kidney, and of the process by which this healing is accomplished, even after extirpation of considerable portions. Paoli* of Perugia performed extraperitoneal operations for resection of the kidney upon twenty-five dogs, cats, and rabbits, with perfect recovery, and published his results in 1890.

But such experiments were not required to convince us that wounds of the human kidney readily heal. In 1883 and 1884 I collected for my work on diseases of the kidney a number of cases, proving the cicatrising capacity of the human kidney after incised, punctured, lacerated, and also gunshot wounds. Such cases, known long before the days of renal operations, might have given surgeons faith in the reparative power of renal wounds of their own making, but it has been only by slow degrees, and quite recently, that they have become convinced that a free incision or a partial excision may be made without fear of dangerous bleeding on the one hand, or of an urinary fistula following the operation on the other hand.

In 1890 I had the opportunity of examining a kidney which I had freely incised for exploratory purposes a month before, and which was removed from the body of a patient

* "Verh. des Internat. Med. Cong., Berlin, 1890."

who died from hæmorrhage from a gastric ulcer. A linear scar extending through the cortex to the renal pelvis was the only evidence in the organ that an operation had been performed upon it. The kidney otherwise had the appearance of being perfectly healthy.

Up to the present time partial excision or resection has been very rarely performed; and surgeons, whether aware of the results of such experiments as Tuffier's and others, or not, seem to hesitate to apply the method in man.

An excellent epitome of the work hitherto done in this direction is contained in a paper read before the British Medical Association at Carlisle in 1896 by Oscar Bloch of Copenhagen. He therein reports a case in which he removed, in September, 1895, half the kidney affected by a new growth; and gives abstracts of ten cases which he collected from German and French sources. The first partial excision was by Czerny in November, 1887, for an angeio-sarcoma following injury. Tuffier has operated in three cases; in his first case, which was done in 1889, he cut out a fistulous canal and sutured the cut surfaces of the kidney together; the wound healed by first intention. Kümmell has operated also in three cases, Bardenheuer in two, and Waitz in one.

Three out of the eleven operations were for cysts, of which one was hydatid; three were for calculous pyonephritis; two were for new growths, and one each for puerperal pyonephritis, renal fistula, and a patch of interstitial nephritis mistaken for malignant growth. Not one of these eleven patients died from the operation. Nine of them made good recoveries therefrom, one subsequently required nephrectomy, and in one a fistula resulted.

Bloch makes no mention of any English or American cases. My own experience of resection commenced in November, 1890 (Table VII., No. 6), when, in drawing out a kidney of a young man, aged twenty-four, which I was exploring for calculus, several abscesses were seen in the cortex, which I opened and evacuated and scraped. The kidney was replaced and the loin wound closed, but a week later I had to remove the whole kidney on account of acute general pyonephritis. The man quite recovered after a long convalescence, and is well, and leading an active life to-day.

In April, 1892 (*British Med. Journ.*, 1892, vol. i., p. 899), I scraped out six tuberculous, breaking down caseous masses in the kidney of a man aged twenty-eight, which I was exploring for calculus. The raw surfaces of the kidney from which these deposits were removed were treated freely with iodoform emulsion; the kidney was then put back into position and the lumbar wound closed. An excellent recovery followed, but some two years afterwards he returned with tuberculous disease of one of the testes, but no further trouble in the kidney; the testicle also was treated by incision and erasion, and he again recovered (Table VII., No. 8).

In a third case, that of a female aged twenty-eight, whose left kidney I was exploring for stone, on January 2nd, 1895, I found three areas of grouped miliary tubercles at different points of the kidney. I removed them by excising three wedges of the renal parenchyma, and in so doing opened up the calyces. At one of these wounds I shaved off layer after layer till I reached healthy kidney tissue. The cut surfaces were sutured with catgut, three sutures in each wound. The kidney was then replaced, and the parietal wound closed. After the operation blood was passed with the urine for three days. The patient made a rapid recovery, and left the home without a sinus on January 16th, 1895. In March, 1897, two years and two months afterwards, her husband wrote stating that she had steadily improved in health since the operation, and was then well (Table VII., No. 16).

In three other cases I have done similar operations on women. In one of them quite a third of the kidney was removed for tuberculous disease. All recovered from the operations. One, a woman, aged forty-five, from whom I removed an abscess in the renal parenchyma, recovered, but symptoms have recurred since (Table IV., No. 41). One from whose right kidney I excised a cyst and a tuberculous abscess, lived three years afterwards without a fistula or any return of trouble in this kidney (see Table VII., No. 14), and died of an acute attack of broncho-pneumonia in 1897. The third, from whose left kidney I removed quite a considerable portion for tuberculous disease, recovered without a fistula, but seven months afterwards an abscess formed in the iliac fossa of the same side and opened at the scar. The kidney

and a great part of the ureter were subsequently removed, as it was thought they were the cause of the abscess, but this was not so, although the kidney was considerably diseased (see Table VII., Nos. 22 and 28). She subsequently had severe hæmoptysis, and died of tuberculous disease of the lung and peritoneum, and a tuberculous ulcer in the bladder.

Partial resections are capable of a wider application than has yet been given to the operation, especially in the case of tumours taking origin from the renal capsule, and those which, though originating in the perinephric tissue, grow into, and partially destroy the kidney itself.

In an operation upon an elderly woman in 1896 I endeavoured to save the kidney when removing a large perinephric fibro-lipoma, but in the course of the operation I found it impossible to do so. If in future such tumours are operated upon before they attain so large a size as practically to destroy or surround the kidney, there is no reason why they should not be removed without interfering with the kidney, or at any rate without excising more than a small portion instead of the whole of the organ.

Besides the cysts which project from the parenchyma and the morbid conditions of the cortex which have been referred to, it is reasonable to anticipate that innocent tumours, such as villous papilloma will be successfully removed from the renal pelvis without sacrificing the whole organ by nephrectomy. Some of the few specimens of this disease which are in our museums would have been quite amenable to this treatment. Bardenheuer and, in this country, E. Owen and Keetley, acting on the same conservative principle, have treated cases of accidental injuries of the kidneys by taking away a portion and leaving the bulk of the organ. Dr. Nash, of Wallsend, N.S.W., in June, 1897, removed from a youth, æt. eighteen years, a portion of the kidney and kidney capsule which had been broken off from the rest of the organ by a kick from a horse. The portion of the kidney left consisted of about five-eighths of the whole organ; it lay in its proper place, with a clean cut incision passing from before backwards at the level of the upper end of the renal pelvis. The operation was done one week after the injury. The patient made a good recovery (*Australasian Medical Gazette*, Nov. 20th, 1897).

OPERATIONS ON THE URETER.

Operations upon the ureter are an advance of the last few years, but not many have been recorded up to the present time.

They are of very considerable importance because of the influence they are having, and are destined to have, upon renal surgery generally.

Ureterotomy has been employed in the treatment of hydronephrosis, calculus, and calculous anuria. Ureterectomy will improve the results of operations for advanced tuberculous disease descending from the kidney, and also of those performed for calculous pyonephrosis complicated with suppurative ureteritis. Ureteral anastomosis and other plastic operations on the ureter will save many kidneys which would formerly have been nephrectonised on account of hydronephrosis, fistulæ, and surgical injuries of the ureter.

It is of interest to note that ureterotomy, like nephrotomy and nephrolithotomy, was suggested many years before it was put into practice. The first allusion to it which I have met with is in Velpeau's Surgery (edition 1851, p. 1021). Velpeau mentions it in connection with an account of a case under his own care, in which a calculus the size of a nut, and having a pin in its centre, was impacted in the right ureter three inches below the kidney. The posterior wall of the ureter was perforated at the level of the calculus, and there was (periureteral) suppuration in the retroperitoneal tissue, extending from the kidney to the floor of the pelvis. Velpeau satisfied himself upon the dead body that this stone might have been readily extracted by the flank on the same side.

In 1856 a remarkable series of articles was published by Dr. C. Gigon of Angoulême (*L'Union Médicale*, Feb. 14th, 16th, 21st, 1856), in which he suggested opening the ureter with the object of establishing an artificial passage for the escape of urine in a case of calculous anuria. He called the operation he proposed ureterotomy, investigated the anatomical causes which determine the impaction of calculus in the ureter, gave an excellent description of the normal anatomy, and figured the natural dilatations and contractions in the lumen of the ureter. He pointed out the

intimate relation of the ureter with the peritoneum, and that it is the peritoneum which maintains the ureter in contact with the psoas magnus. This led him to explain the rationale of enforced walking exercise upon a calculus impacted in the ureter; the contraction of the fibres of the psoas, he thought communicated to the ureter a sort of peristaltic action which made the stone descend towards the bladder.

He gave the explanation based on his anatomical knowledge, and upon a *post-mortem* examination of a case in which he found a movable right kidney opposite the third and fourth lumbar vertebræ, of the occurrence of hydronephrosis in association with movable kidney. This, be it observed, was forty-two years before the same explanation was credited to Landau, Terrier, and Baudoin respectively. He attributed it to kinking of the ureter, which, fixed by the peritoneum, cannot follow the kidney in its displacements, and thus causes it to form a curve with the convexity upwards, all the more pronounced as the kidney gets lower and lower. The result of this curvature, he thought, was to obstruct the urine, or even to render its flow impossible. Finally, he described the operations of ureterotomy and lumbar ureterostomy precisely as they are now performed. Gigon thought that the obstruction to the free flow of urine due to the kinking of the ureter was a predisposing cause of stone in movable kidneys, and in support of this view, I may say that I have seen several instances of very movable kidneys which contained calculi; as well as cases in which the kidneys have been greatly disorganised from stone, with the ureters strictured or of very small size, and thus giving rise to more or less obstruction. Fig. 3 is an illustration of a small ureter and a stone impacted immediately above it.

Ureterotomy for Calculus. — In 1879 Thomas Addis Emmet of New York (in the edition of his work on the "Principles and Practice of Gynæcology," published in 1879) stated that in three cases he had met with stones obstructing the vesical end of the ureters. In one he removed the stone through the bladder by means of curette forceps after opening the bladder. In the second case he removed a stone weighing 98 grs. by cutting upon it through the vaginal wall without having opened either the bladder or the peri-

toneum, and he closed the opening with interrupted sutures. His third case does not seem to have been operated upon.

It was not, however, until the year after Hahn's first nephrorrhaphy that ureteral surgery fairly commenced. In 1882 Bardenheuer performed ureterotomy for calculous

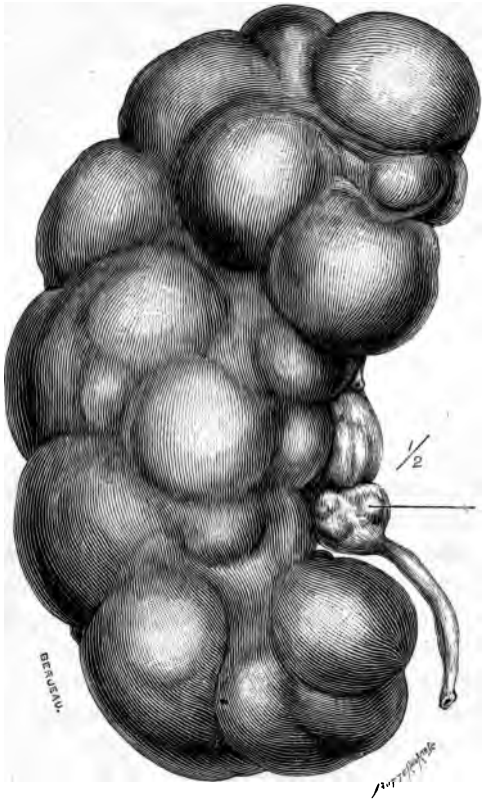


Fig. 3.—Small ureter with contractions of its lumen. A stone plugs the infundibulum, and the kidney is completely disorganised. (Author's case. Table III., No. 15).

anuria, removed four stones, one of which was impacted in the upper end of the ureter, and closed the ureteral incision by sutures. In Bardenheuer's case the urine did not find its way subsequently into the bladder, so he divided the ureter and established a lumbar ureterostomy.

In 1884 I published a paper advocating the extraction of calculi impacted in the intra-vesical portion of the ureter

through the bladder, by opening the bladder from the perineum in the male, and by dilating the urethra in the female; and I suggested that this might be found useful in cases of calculous anuria, and might obviate the performance of nephrectomy in certain cases of calculous hydronephrosis. I therein related a case of calculous anuria, in which, by scratching through the margin of the vesical orifice of the ureter with my finger-nail, I tried to get a calculus into the bladder and thence remove it through the urethra (*Amer. Journ. Med. Sciences*, Oct., 1884, p. 455).

In 1885 Cullingworth removed a calculus from the lower end of the ureter of a woman, by abdominal section. In this case stones could be felt per vaginam in both ureters. The operation was designed and undertaken for abdominal nephrectomy. The right kidney formed a large tumour, but a stone being found in the right ureter this was removed instead. Death followed from uræmia.

In 1887 Ceci (*La Riforma Medicale*, September 5th, 1887) removed seven calculi from the lower end of the ureter by an incision through the rectum. The patient, however, died.

In 1887 ureterotomy was performed, and has since been repeated in several cases, for the extraction of calculi impacted in different parts of the ureter by means of a retroperitoneal operation in the lumbar or inguino-lumbar region, by Godlee in 1887, by Kirkham and Torrey in 1889, by Twynam in 1890, and by several other surgeons more recently.

Ureterotomy for stricture and valvular obstruction.—Another application of ureterotomy is in cases of **ureteral stenosis.** Simon in 1876 was the first to give theoretical directions for this operation. I do not know that he ever performed it. Trendelenburg in 1890 was, I believe, the first to make the attempt.

In 1892 Fenger of Chicago performed the first successful ureterotomy for a valvular obstruction of the ureter. (*Trans. Amer. Surg. Assoc.*, 1894, vol. xii., p. 142.) The patient was a woman aged twenty-eight, with intermittent hydronephrosis in a floating kidney. He explored the dilated renal calyces for stone through an incision in the convex border of the kidney. No stone was present. As he could not catheterise the ureter through this incision, he made a small

opening in the posterior wall of the infundibulum, and found a valvular obstruction at the top of the ureter where it joined the renal pelvis. The valve was divided, and the ends of the incision were united by a suture. A bougie, now passed through the wound in the parenchyma, was retained in the ureter for two days. The wound in the renal pelvis was closed by sutures. The floating kidney was fixed. The patient recovered without fistula, and subsequently had no return of hydronephrosis.

On November 26th of the same year (1892) Fenger operated upon a man aged forty-seven for intermittent hydronephrosis of twenty years' duration, due to a stricture of the ureter close to its junction with the infundibulum.

The stricture was produced by an injury when the patient was thirteen years old by his jumping from the back of a horse. The kidney and upper end of the ureter were exposed through a lumbar incision. The upper end of the ureter for half an inch was found imbedded in cicatricial tissue; below this the ureter was normal. A longitudinal incision, a centimetre long, was made into the ureter just below the cicatrix, and the strictured part of the tube was divided from below upwards to the renal pelvis. The ends of the incision in the ureter were stitched together by the Heinecke-Mikulicz manner for closing the pylorus after division for stenosis.

The next successful operation of this sort was performed by Herman Mynter of Buffalo, on August 14th, 1893. The patient was a man aged twenty-five, who for twelve years had suffered from painful intermittent hydronephrosis, due to a valvular obstruction at the upper extremity of the ureter. Calculus was diagnosed as the cause of the obstruction, but no stone was found. On exposing the kidney and upper part of the ureter through the "usual oblique incision" in the loin, a valve formation at the junction of the ureter and renal pelvis, and a hydronephrotic distension of the infundibulum of the size of an orange, were discovered. An incision an inch long was made into the lower part of this swelling, and about half a pint of pale limpid urine evacuated. Through this opening in the infundibulum the kidney and ureter were explored. The incision was then prolonged downwards through the valvular stricture, the lateral margins of the

wound were pulled apart, and the ends united by numerous fine silk sutures, avoiding the mucous membrane. After the wound was sutured, the opening into the ureter from the renal pelvis was somewhat funnel-shaped. The patient recovered without a fistula, and remained well subsequently.

I have recently done a similar operation on a female patient, aged twenty-nine, who for four or five months had had intermittent periods of aching or discomfort in the

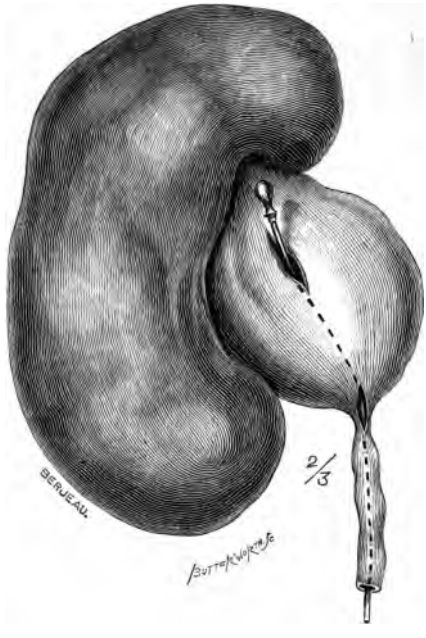


Fig. 4.—Pelvis of the kidney and upper end of ureter, showing the stricture at their junction. A probe has been passed along the ureter through an opening in the infundibulum. (Author's case. Table VI., No. 19.)

right kidney (which was very movable), associated with very frequent micturition, sometimes almost amounting to incontinence. At these times the urine became very thick and offensive; and at other times there was pus in small, but distinct, quantity in the urine. There was marked tenderness on bimanual examination, so that renal calculus was suspected.

Twelve months before her symptoms began she was thrown from a horse on to a heap of stones and a good deal shaken. Possibly this had some influence in causing the condition

found at the operation. After consulting with Sir William Roberts and Dr. Cullingworth, it was decided that the kidney should be explored and fixed; and Dr. Cullingworth and Mr. Burghard were present at the operation. Through a lumbar incision the upper end of the kidney was seen to be firmly bound down by tough fibrous adhesions, almost as hard as cartilage. In the contraction of these adhesions the kidney had become slewed round, so that its

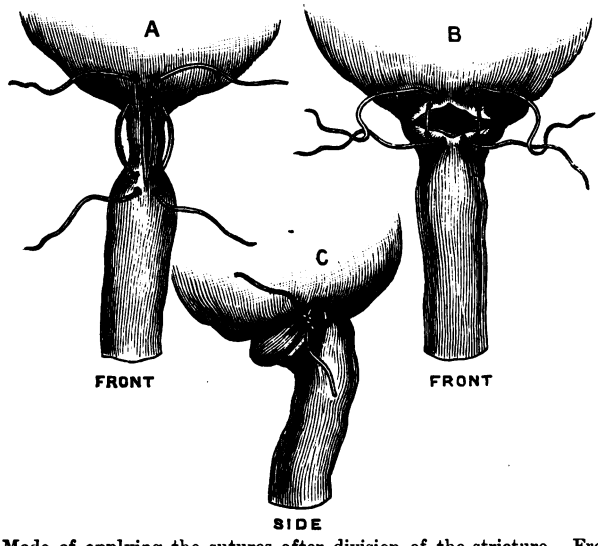


Fig. 5.—Mode of applying the sutures after division of the stricture. From same case as Fig. 4. In the side view the pucker caused by tightening the sutures is somewhat exaggerated in the figure.

upper end had been drawn lower than its lower end, and the front surface came to look backwards. At least this was the explanation of the abnormal position which suggested itself during the operation. The pelvis of the kidney was distended to the size of a tennis ball, and the ureter, which joined the infundibulum normally at its lower point, was so constricted as barely to admit the smallest ureteral catheter (see Fig. 4). The kidney was incised along the convex border and thoroughly explored for stone. None was present, but the calyces were found slightly sacculated. The constricted orifice of the ureter was longitudinally divided upon the catheter, which was passed from a small opening in the

infundibulum through the stricture to the bladder, and the ends of the incision were drawn together, by the Heinecke-Mikulicz method, by means of two fine silk sutures, passed after the manner of Lembert (see Figs. 4 and 5). The wound of the renal parenchyma was sutured with silk. Nephropexy was then performed by Vulliet's plan. The wound healed entirely by first intention, and there has been no return since of the symptoms which led to the operation.

Resection of the Ureter is the operation whereby an inch or two, or a little more, of the duct is removed, and the ureter is united to the infundibulum, or the divided ends of the ureter to one another, as the case may be, so as to restore the continuity of the conduit.

It was first proposed by Marcel Beaudoin in 1891, and first performed by Küster in May, 1891. Küster's case is a most important one, not only as being the pioneer case, but as a serious warning that we ought to practise conservatism in dealing with the kidney; and an indication that in hydronephrosis, nephrectomy ought to give place to nephrotomy, or to ureterotomy, in any case in which either of these operations gives promise of success.

Küster reported his case at the Congress of Surgeons held in Berlin in 1892.* The patient was a boy, aged thirteen, with only a single kidney, who for two years had passed *all* his urine through a fistula, following lumbar nephrotomy, for hydronephrosis. The cause of the hydronephrosis was a very tight stricture of the ureter near the renal pelvis. The strictured part of the ureter was excised, and the cut end of the ureter was sutured to the renal pelvis. By the end of four months from the date of this operation all the urine was passed naturally, and the fistula was quite closed.

In the discussion on Küster's communication at the Berlin Congress, Trendelenburg and Alsberg reported that they had each done a similar operation. Trendelenburg added that his patient had died from intestinal obstruction, due to adhesions between the hydronephrotic sac and the colon.

Cramer of Cologne followed Küster's lead in a case of hydronephrosis in 1893; and again in operating on a case of

* *Archiv für Klinische Chirurgie*, vol. xliv., 1892, p. 850.

pyonephrosis in 1894; in both a non-urinary short fistula was present when the patients were last seen.*

Enderlen, in a paper on the "Surgery of the Ureter,"† relates a case in the practice of Helferich, in which Küster's operation was performed upon a young woman, twenty-five, with hydronephrosis. She died on the ninth day with symptoms of anuria. At the necropsy, the kidney of the opposite side was also hydronephrotic from an obliterated ureter. Nephrectomy in this case would have been even more rapidly fatal. As stenosis seems to have followed the plastic operation in this instance, one is led to ask why a lumbar renal fistula was not established as soon as the signs of anuria set in.

M. Bazy (*Acad. de Med.*, May 30th, 1897) in October, 1896, performed a precisely similar operation to Küster's, to which he gave the name of uretéro-pyélo-néostomie.

His patient was a man, aged forty, with a large hydronephrosis, for which relief was given by evacuating the pent-up urine by laparotomy. This gave M. Bazy the opportunity of ascertaining that the hydronephrotic kidney was of very fair secreting capacity. The cause of the distension was the abnormality of the connection of the ureter with the renal pelvis: it opened into the infundibulum above its equator instead of at its lowest part. The incision into the hydronephrotic pouch was prolonged downwards and backwards; four centimetres of the ureter were cut away: the cut end of the ureter was split longitudinally to the length of a centimetre and a half, so as to enlarge the orifice of communication, and was then fixed to the back of the dilated infundibulum at its most dependent part. On the seventh day after the operation the urine was passed from the kidney operated to the bladder. One month later the abdominal wound was completely healed. At the end of five months the patient reported himself as being in in excellent health.

Weller Van Hook in 1893 published a case in which he practised Küster's operation, but immediately he had completed it he found an obstruction in the ureter lower down, and therefore removed the kidney.

In 1897 I operated upon a female patient aged fifty-seven.

* *Centralbl. f. Chirurgie*, 1894, No. 47, p. 1145.

† *Deutsche Zeitschr. f. Chirurgie*, t. xliii., p. 309.

for painful intermittent hydronephrosis and found the ureter running obliquely in the wall of the distended renal pelvis. In this case I first laid the ureter and renal pelvis freely open into one another by a longitudinal incision, and stitched the divided edges of the ureter to those of the renal pelvis. The result was not satisfactory, so I excised three-quarters of an inch of the ureter, closed the

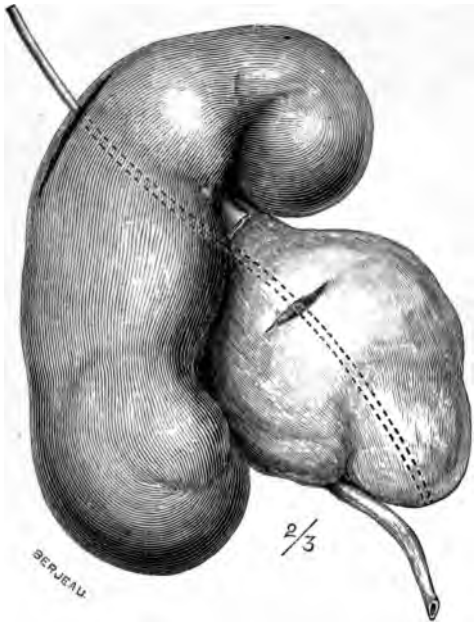


Fig. 6.—Abnormal relation of ureter to infundibulum before operation (Author's case. Table VI., No. 17.)

greater part of the incision in the renal pelvis, and then sutured the ureter to the lowest part of the infundibulum as Küster had done (see Figs. 6 and 7). Again the result did not satisfy me because of the small calibre and extreme tenuity of the ureter; so, to avoid a fistula and a long convalescence on the one hand, or stenosis of the ureter at the site of operation and a subsequent nephrectomy, on the other hand, I removed the kidney there and then. Had the patient been younger and more robust, I should, even with so small a ureter, have given the plastic operation a chance of succeeding. The case

however, testifies to the feasibility of both Fenger's and Küster's operations when the ureter below the constriction or valve is of normal diameter.

The nine operations for resection of the ureter for hydronephrosis (or pyonephrosis) above quoted show that the aim in our treatment of hydronephrosis ought to be conservative.

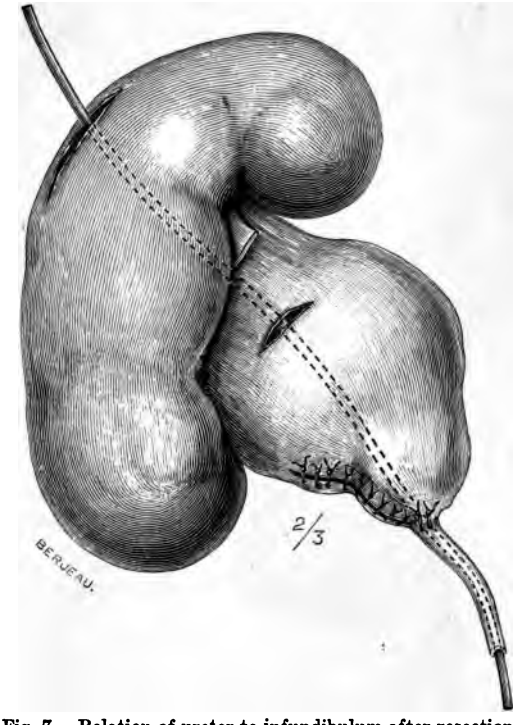


Fig. 7.—Relation of ureter to infundibulum after resection. (Author's case. Table VI., No. 17.)

Before actually proceeding to resect the ureter for stricture or a valve, the surgeon should not fail to ascertain whether there is a clear channel in the ureter below the stricture or valve to be divided; otherwise he may find that the operation is useless when completed, as it was in Van Hook's case. It may happen, even if the rest of the ureter is unobstructed, and the plastic operation has been completed, that the small calibre, or extreme tenuity of the walls of the ureter may make the operator dissatisfied with the result, in view of probable future stenosis. Under these circumstances



Fig. 8.—Kidney with enlarged pelvis containing plates of lime. It shows an abnormal relation of the renal pelvis to the ureter, which might have been remedied by operation, and thus the pyonephrosis prevented. (*Middlesex Hospital*, October 30, 1895. Author's case. Table VI, No. 15.)

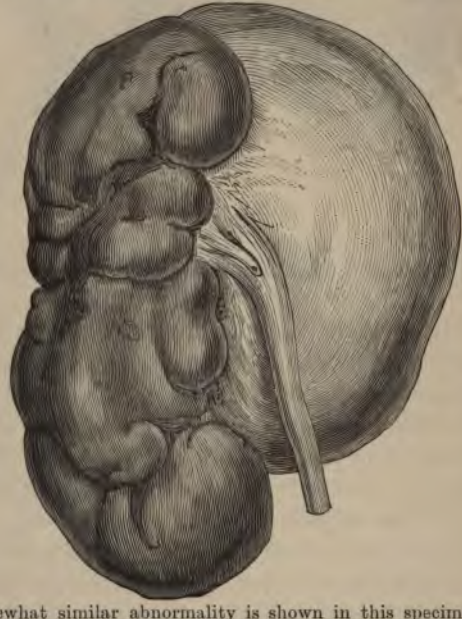


Fig. 9.—A somewhat similar abnormality is shown in this specimen, which could have been prevented or remedied by uretero-pyelo-neostomy. (*Middlesex Hospital Museum*. Author's case. Table VI., Nos. 10 and 11.)

nephrectomy will be required after all. But the attempt ought to be made, in every instance where the conditions are not

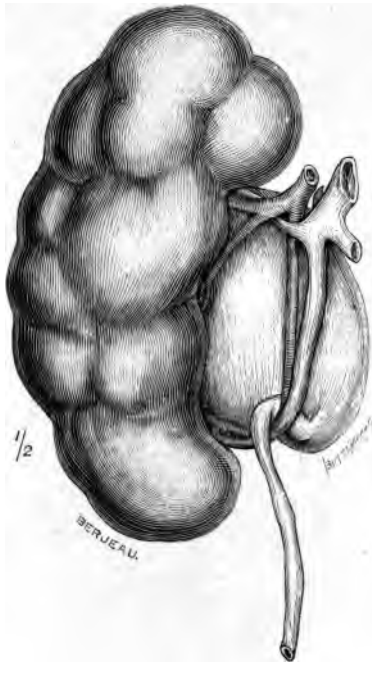


Fig. 10.—Hydronephrosis. Ureter compressed by renal vessel. (*Guy's Hospital Museum*, No. 1694.)

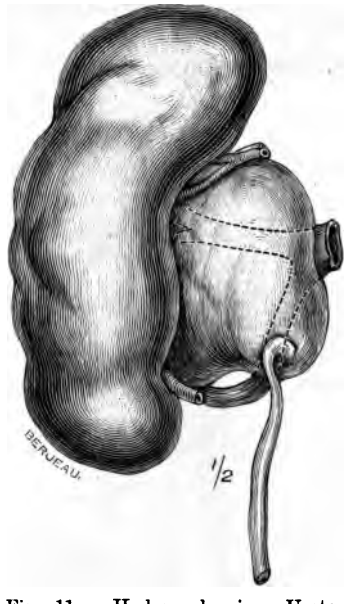


Fig. 11. — Hydronephrosis. Ureter kinked on renal pelvis: described as kinked over renal vein. (*Guy's Hospital Museum*, No. 1693.)

Abnormalities remediable by uretero-pyelo-neostomy.

actually unfavourable, to preserve the kidney by means of a plastic operation.

Ureterectomy.—By resection of the ureter is meant the cutting out of a short piece of the duct, not exceeding two to two and a half inches, with the object of restoring it to its proper capacity as a conduit of the urine to the bladder. It is a truly conservative operation. More extensive excisions of the ureter, and even the removal of the whole length of the duct, have of late years been occasionally practised, and with most beneficial results; but, like nephrectomy, such operations are of course not of a conservative nature.

Ureterectomy, partial or complete, has been performed for tuberculosis, suppuration in the dilated ureter, hydrops of the

ureter, and for the cure of suppurating lumbar fistula due to the presence of a diseased ureter, after nephrectomy had been done. The operation may be either primary or secondary. It is primary when the ureter is removed simultaneously with the kidney; secondary when the excision of the ureter follows the removal of the corresponding kidney as a distinct and subsequent operation.



Fig. 12.—Renal capsule and ureter (two-thirds original size), the seat of tuberculous disease, removed thirty-one days after nephrectomy. (*Middlesex Hospital Museum.* Author's case. Table VII., Nos. 20 and 21.)

Secondary total ureterectomy was first performed piecemeal by Regnier in 1892, and by Gerster of New York in 1896; secondary partial ureterectomy by Poncet in 1894, and by myself in March, 1896 (*Lancet*, Jan. 1st, 1898, case ii., p. 19). (See Fig. 12.)

Primary total ureterectomy was performed by Kelly of Baltimore in 1896, and by McCosh in 1896, and by myself in September, 1897 (*Lancet*, January 1st, 1898, page 20, case iii.). In my case there had been a partial excision of the kidney previously, but the greater part of the organ was removed at the same time as the ureter.

Primary partial ureterectomy was performed first by Tuffier in 1891, then by Postnikow in 1892, by Kelly and myself in 1893; and I have recently published a case in which the ureter was extensively calcareous, upon which I operated in August, 1895 (see Fig. 13). (*Lancet*, 1898, vol. i., p. 18.)

Two different routes have been followed in the complete removal, namely, the transperitoneal and the extraperitoneal;



Fig. 13.—Kidney and portion of ureter (half original size) removed for tuberculous disease of the kidney and ureter. (*Midalesex Hospital Museum*. Author's case. Table VII., No. 19.)

but the latter, when the incision indicated in the accompanying diagram (Fig. 24, p. 117) is adopted, gives so complete and satisfactory a field for the necessary manipulations, and has other anatomical and surgical advantages, that it is not probable the transperitoneal method will find any followers.

Several different routes have been taken or suggested for partial ureterectomy affecting the lower part of the duct.

In the male the inguinal extraperitoneal route, *i.e.* through an incision the same as the lower part of the incision for complete extraperitoneal ureterectomy, is the best; but in the female the para-sacral as advocated by Cabot and Fenger (*Trans. Amer. Surgical Assoc.*, 1894, p. 133), or a combination of the inguinal and vaginal methods as practised by Kelly, have advantages over the others (see Figs. 14 and 15).

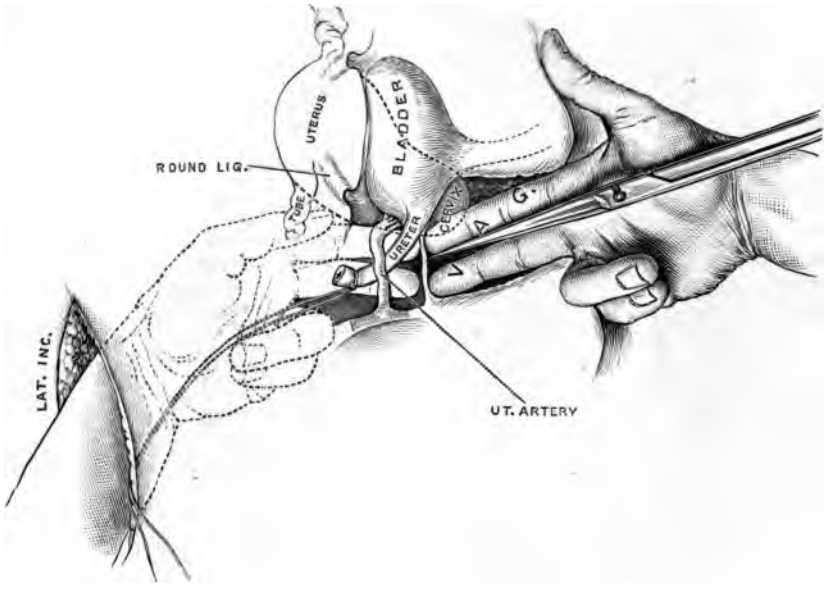


Fig. 14.—Opening the vaginal vault to bring the extremity of the right ureter through into the vagina. One hand is represented within the retroperitoneal abdominal wound, and two fingers of the other hand are within the vagina.

H. A. Kelly, M.D., *The Johns Hopkins Hospital Bulletin*, Nos. 59, 60, Feb. and March, 1896.

WOUNDS OF THE URETER.

Another way in which great advance has been made in renal surgery, in the conservative direction, is in the management of wounds of the ureter inflicted accidentally during the course of such operations as ovariotomy, abdominal and vaginal hysterectomy, and the removal of suppurating fallopian tubes and ovaries. The ureter has also been wounded in at least one instance during the course of an operation on the pelvis by the method known as Kraske's.

Spencer Wells (*Med. Chir. Trans.*, 1881), in his paper on the first successful removal of a gravid cancerous uterus, stated that out of ninety-four published abdominal hysterectomies one ureter had been divided in six, and both ureters

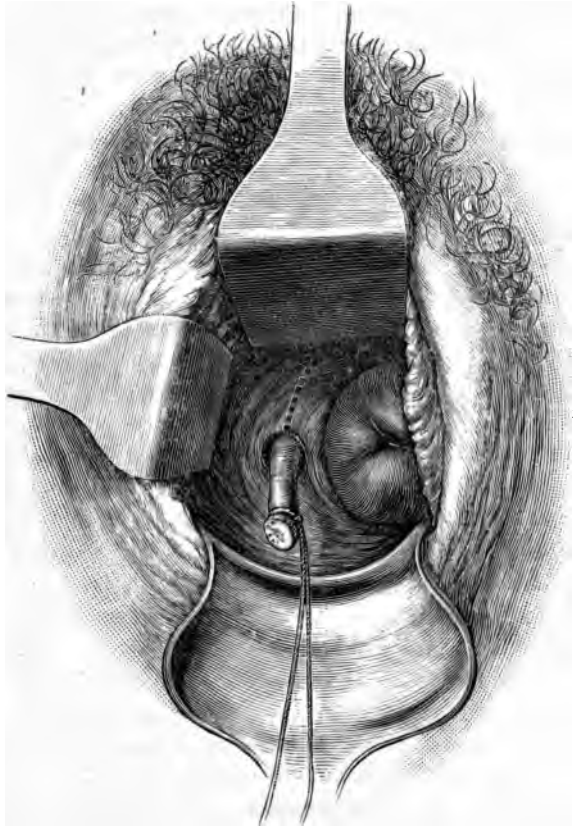


Fig. 15.—Removal of the lower end of the ureter through the vagina. The ureter is seen after it has been pulled through the vaginal vault.
H. A. Kelly, M.D., *Bulletin of the Johns Hopkins Hospital*, vol. vii., Nos. 59 and 60.

in two other cases. It has since been computed that in every hundred* hysterectomies, vaginal and abdominal, one or both ureters are tied, or cut across in at least three.

From time to time unpublished cases are heard of in

* Dr. Fred Byron Robinson: Discussion on Fenger's paper (*Chicago Medical Reformer*, March, 1893, p. 200).

which the ureter has been divided partly or entirely; or portions have been unintentionally resected.

For these injuries nephrectomy had hitherto been performed, and in many instances of the kind healthy kidneys have been removed.

This is a discomforting reflection; and, not unnaturally, as soon as accidental surgical wounds became of pretty frequent occurrence there were surgeons who set themselves to devise some alternative for nephrectomy.

Numerous experiments on animals were made by Tuffier, Boari and Pozzi in France, Gusserow and Pawlik, Alfonso Poggi of Bologna, Van Hook, Byron Robinson, Bovée and others in America, and a great variety of methods have been devised for remedying the injury without sacrificing the kidney.

They may be grouped into two distinct classes, viz.: (1) Those designed to restore the continuity of the ureter; and, failing this, (2) those for anastomosing the cut end of the ureter with the external surface, with the intestine, or with the bladder.

If the ureter should be wounded during an abdominal or vaginal operation, and the injury is detected by the surgeon at the time, one or the other of these operations ought to be, if possible, immediately practised. Such a complication can only be suitably grappled with by one familiar with the varieties and possibilities of surgery which recent experiments and scattered cases have brought to light.

It is very desirable, therefore, that surgeons and gynæcologists who are exposed to the risks of injuring the ureter should have a fair working knowledge of the remedies, short of sacrificing the kidney, which are available.

Uretero-ureteral Anastomosis.—Schopf,* in 1886, was the first who practised uretero-ureteral anastomosis in the human subject. He adopted the end-to-end method. After having accidentally divided the ureter near the pelvic brim, when removing an ovarian cyst, he used eight fine silk sutures, passing them through the cellular and muscular tissues only, to unite the ureter *end to end.* The patient made an uneventful recovery from the operation, but died seven weeks later of tuberculosis. The inference to be drawn from the

* F. Schopf, *Centralblatt für Gynäkologie*, No. 30, 1887.

account of the autopsy is, that there was cicatricial stenosis about the seat of operation.

E. W. Cushing of Boston recorded the second case of the *end-to-end* method, and speaks of his operation as being original, by saying that it forms "a rare, if not unique, incident in the surgery of the ureter."* Pawlik, Tuffier, Hochenegg, and H. Fritsch are the other surgeons who have employed the *end-to-end* method.

In 1887 Alfonso Poggi† (of Bologna) suggested the plan (based on experiments on dogs), of invaginating the upper into the lower end of the divided ureter. This is the *end-in-end* method.

In 1893 Van Hook‡ of Chicago published a description of his experiments on dogs, for the lateral implantation of the upper portion of the ureter into an opening in the side of the lower portion. Both Poggi and Van Hook were so impressed by their respective experimental results that they considered a trial of their operations upon man justified.

Weller Van Hook's operation, by lateral implantation, is performed as follows:—

1. The lower segment is closed by a ligature, one-eighth to a quarter of an inch from its free end. Then, with fine, sharp-pointed scissors, a longitudinal incision is made in the wall of this segment of the duct, a quarter of an inch below the ligature. This incision is twice as long as the diameter of the ureter.

2. A longitudinal incision, a quarter of an inch long, is made in the open end of the upper segment. This incision insures the patency of the duct.

3. Two small cambric sewing needles, armed with one thread of sterilised catgut, are passed through the wall of the upper part of the ureter, opposite the slit at the open end, and one-eighth of an inch from the extremity, from within outwards; the needles transfix the wall one-sixteenth of an inch apart, and equidistant from the cut end.

4. The needles are now carried through the slit in the side

* *Annals of Gynæcology and Pediatry*, vol. vii., February, 1893.

† *Riforma Medica*, 1887–8, N.S. viii., 39.

‡ *Journal of American Medical Association*, No. 21, July—December, 1893.

of the lower segment of the ureter, and made to transfix the wall, side by side, half an inch lower down the tube.

5. By drawing in the two ends of the suture, the upper portion of the ureter is drawn into the lower, and the ends of the suture are firmly tied together. As the catgut becomes absorbed in a few days, calculi do not form upon this suture and obstruct the passage of urine.

6. The ureter at the seat of union is now enveloped carefully with peritoneum. This may be done by lifting the

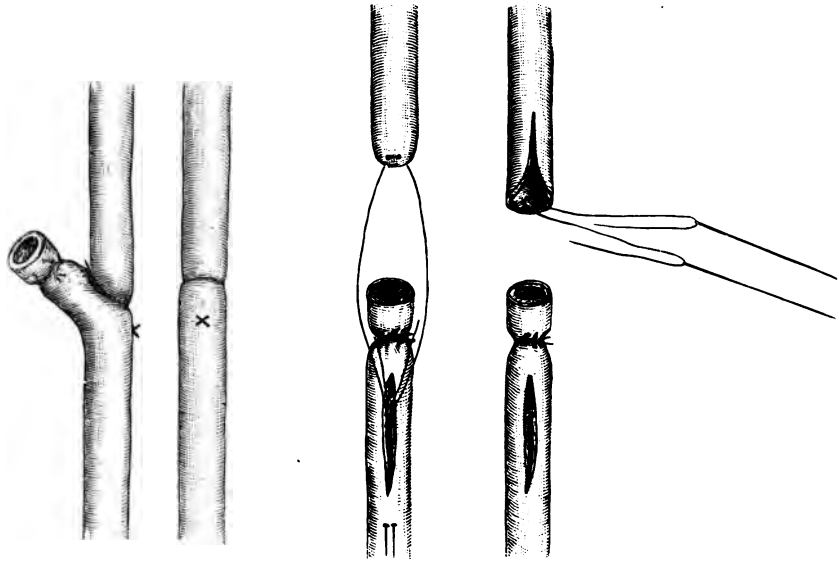


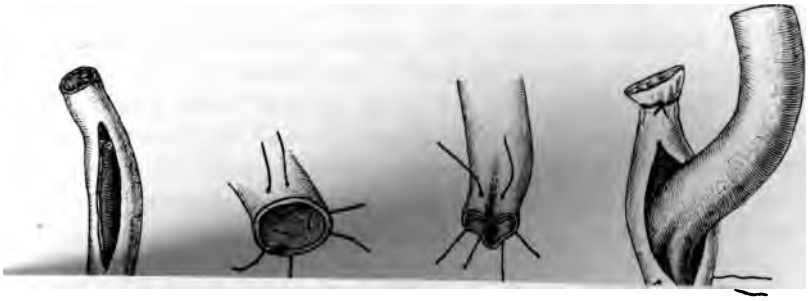
Fig. 16.—Van Hook's method of lateral implantation.
Journal of American Medical Association, vol. xxi., July—December, 1893.

ureter gently into the cavity of the peritoneum, drawing the serous membrane carefully behind the ureter, and, after pulling the peritoneum around the ureter, stitching it in position, to permanently enclose and protect the duct. Or, the ureter may be surrounded in a completely detached fold of omentum, which is loosely attached by a stitch to the connective tissue about the duct.

The omental method is less secure than the other, since the omentum is deprived of its blood supply.

Howard Kelly of Baltimore, B. Emmet of New York and Doherty of Georgia have successfully applied Van Hook's operation to the ureters of women.

When the upper portion of the divided ureter is very much



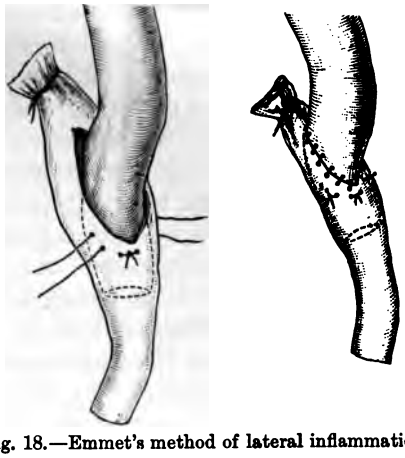


Fig. 18.—Emmet's method of lateral inflammation.
Bache Emmet, *American Journal of Obstetrics*, April, 1895.

distended, and has to be puckered to get it into the lower portion, which may be only half its size, or even less, three

sutures, instead of one, might be advantageously employed as was done by Emmet.* This may be the condition of things if the ureter happens to be cut just where the pressure of the tumour or adhesions had been exercised. Emmet's abdominal operation was the removal of an œdematous fibroid, attached over the fifth lumbar vertebra, and which had been at one time attached to the uterus.

In Kelly's case, operated upon in May, 1892,† as the result of pressure from an uterine myoma, the ureter was enlarged to four times its normal circumference, forming a well-marked hydro-ureter. The operation, therefore, was much easier than it would have been on a normal ureter. Kelly used two sutures, instead of one as Van Hook did; and passed them with a single needle, commencing the passage of the sutures below the slit in the lateral walls of the lower segment of the ureter. Ten fine silk rectangular sutures, catching only the outer coat, then united the edges of the slit to the intussuscepted portion.

Van Hook points out an important fact in connection with these ureteral operations, namely, "the lumen of the tube can be enormously increased by stretching, without prejudice to the integrity of its walls." Emmet verified this in his operation, where it was of great moment to stretch the lower segment, owing to the great dilatation of the upper.

Finally Bovée, in 1895, adopted a plan which consists in suturing the cut ends together obliquely. He published an account of it in January, 1897.‡ He performed his operation on a woman æt. thirty-six, whose right ureter he unintentionally included in a ligature and then divided, when excising the right ovary and tube for an abscess. He converted the transverse division of the ureter into an oblique one, with some loss of length of the duct. This seemed necessary, as the lower end had been grasped too tightly by strong forceps, and the upper end by the ligature; thus both ends were damaged.

The cut ends were then dilated for an inch, and approximated with No. 1 silk, such as is used in intestinal operations; then the ends were joined by rectangular sutures, with two

* Bache Emmet, *The American Journal of Obstetrics*, April, 1895.

† Reported in *Bull. of Johns Hopkins Hospital*, for October, 1893.

‡ Wesley Bovée: *Annals of Surgery*, Jan., 1897, also Sept., 1897, p. 318.

interrupted sutures intervening between each two rectangular sutures. Over these sutures four or five other sutures were inserted, which reached a little further up and down the duct than the rest. The recovery, immediate and remote, was very satisfactory. No sutures penetrated the mucous membrane of the ureter. The peritoneum was carefully sutured over the injured portion of the duct.

Four methods have been employed, as we have now seen, for uniting the cut ends of the ureter.

1. The lateral implantation devised by Van Hook has

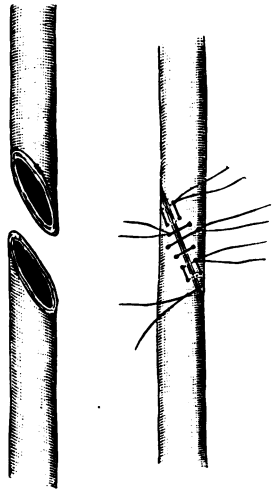


Fig. 19.—Uretero-ureteral anastomosis by the oblique method of Bovée.
J. Wesley Bovée, *Annals of Surgery*, Part 49.

been successfully performed on three women by different operators in each case. It has led to no contraction or stenosis in experimenting on dogs.

2. The transverse end-to-end union has been practised seven times on the human ureter. Four of these cases have been described as cured. Three died from causes quite unconnected with the ureteral operation, one being from tuberculosis seven weeks afterwards, and the other two directly or indirectly from the operation during which the accident to the ureter happened.

3. The oblique end-to-end anastomosis devised by Bovée and performed by him once and with success.

4. The end-in-end invagination of the upper into the lower portion of the ureter, or the method of Poggi, has been employed at least once successfully on a woman, and Poggi's experiments on dogs were eminently successful.

Budinger's and Tuffier's experiments on dogs of the end-to-end and end-in-end methods respectively gave deplorable results.

Out of the twelve cases of the application of these methods to ureters injured during surgical operations, in *eleven* the section of the duct was complete and in one incomplete (Pawlik's case).

To this case of incomplete section of the ureter I may add one of my own, in which the dilated ureter was three parts divided. In both of them the mode of treatment was practically the same—viz. closure of the wound by very fine silk sutures passed in the fashion of Lembert, and covering the injured ureter with the peritoneum.

Pawlik's case died of shock fourteen hours after the operation. My patient died fifty-one hours after the operation, but the union was found secure and able to bear the pressure of a stream of water forcibly injected along the ureter from the infundibulum to the bladder. Had this woman lived there is good reason for thinking that stenosis would not have occurred, because of the dilated condition of the ureter.

My patient was a woman thirty-six years of age, who for eighteen months had been suffering from continual pain and frequent attacks of vomiting caused by a large uterine myoma which was rapidly growing. Complete abdominal hysterectomy was performed on July 21st, 1897. The operation went quite smoothly except for the accident to the ureter, which was immediately recognised, and the cut ends of the ureter were united after the hysterectomy was completed, During the first twenty-four hours after the operation only seven and a half ounces of urine (free of blood) were secreted. Vomiting was excessive and continuous. During the second twenty-four hours twenty-seven ounces of urine were passed, and contained no trace of blood. At the *post-mortem*

examination both kidneys were excessively hydronephrotic; the right could scarcely be said to exist, its parenchyma was so atrophied. The calyces of the left kidney were greatly dilated, and the cortical substance was very thin. Both ureters and the renal infundibula were considerably dilated. The left ureter, just beyond its entrance into the broad ligament, had been wounded and closed by sutures, and the peritoneum was stitched over the united ends. The tube was quite watertight, as tested by a strong current of water. There was no peritonitis, and the wound was healing.

It would be impossible now to enter into a minute comparison of these four methods. As far as results go, all seem to be upon the same footing, for they have all been tested in the human living subject, and from reports published some months or years after the operations no subsequent trouble seems to have occurred to the kidneys.

Personally, I may say that if the ureter was completely divided, and was also much dilated, I should adopt Bovée's *oblique end-to-end* method. If the ureter was completely divided but not dilated, I should prefer Van Hook's. Bovée's might be employed where there is a rather greater loss of substance than could be overcome by Van Hook's method, but the latter would be much more rapidly executed.

For transverse wounds which do not completely divide the ureter, but involve one-third or more of its circumference, Van Hook has proposed the following operation: "Make two longitudinal incisions in the ureter with a pair of small scissors, beginning at the middle of the wound to be closed. These incisions should be equal in combined length to twice the transverse diameter of the tube. Round off the sharp angles of tissue with the scissors and suture longitudinally" (*i.e.* in the direction of the long axis of the tube) "with the object of producing a very wide instead of a very contracted lumen." By this method cicatricial contraction cannot obstruct the flow of urine. When the wound involves the peritoneal aspect of the duct (as it necessarily does in accidents during abdominal operations), he advises that the union should be protected by surrounding it with a fold of peritoneum.

Fenger thinks that even for incomplete transverse wounds, when intra-peritoneal, that it will be safer to divide the

ureter completely, and then to resort to Van Hook's method of lateral implantation, which, he says, is a tried and successful operation. Emmet is of the same opinion.

A mere puncture, or a small wound which merely gapes slightly, may be securely closed by one or more Lembert sutures and a covering of peritoneum. I am of opinion that in many cases, *where one-third or more of the circumference* is involved, that the same method, viz. Lembert sutures and a covering of peritoneum, will suffice. If it is remembered that in many of the cases in which the ureter is injured during an intra-peritoneal operation the tube is more or less dilated, it is not necessary to consider with Van Hook that every incomplete transverse section of the ureter when closed, either by cicatrisation or primary union after direct suture, will have a tendency to result in stenosis. The case I have alluded to above justifies me in this opinion.

If the ureter was divided through half or more of its circumference and dilated, I should do again what I did in this case. If the ureter was not dilated, I should employ one of the methods of Van Hook, being guided by circumstances as to which.

The classes of cases in which uretero-ureteral anastomosis is applicable are the following:—

To restore the continuity of the duct (1) after accidental section during abdominal operations.

(2) After unintentional resection of a short length of the duct during abdominal operations. Two or even three inches may be removed, and the ends afterwards brought together without undue tension on the union.

(3) After resection of a portion of the ureter for strictures, ulceration, sloughing around a calculus, or any other condition which, if not removed, would terminate in stenosis.

(4) After rupture and other injuries from external violence —as soon as the case is diagnosed when intra-peritoneal; and before suppuration or sloughing occurs when retro-peritoneal.

Ureteral Grafting.—An immense amount of labour and ingenuity has been given to devising methods (1) for the cure of ureteral fistula, (2) for the prevention of ureteral fistula, and of nephrectomy, in cases in which there has been a

loss of substance too great to permit of uretero-ureteral anastomosis.

Very numerous have been the experiments to test the feasibility of grafting the cut end of the ureter (1) into the bladder, (2) into the rectum, (3) into other parts of the small and large intestines, and (4) on to the skin in the loin.

Various other ingenious plans have been proposed as substitutes for nephrectomy, whereby the urine is conducted to the bladder even after parts of the ureter, too great to permit of uretero-ureteral anastomosis, or of bladder-grafting, have been cut away, or otherwise destroyed. But the results of actual operations show that grafting into the bladder—uretéro-cysto-néostomie, as Bazy has named it—should be always the operation of choice when it can possibly be done.

All this industry is the result of the comparative frequency of uretero-vaginal and uretero-uterine fistulæ, especially since the vulgarisation of vaginal hysterectomy. Thus a great many ingenious operations, some of great difficulty and requiring attention to very minute operative details, have been practised, or proposed, with the object of avoiding nephrectomy.

How needful this is must be only too well known to surgeons who have experienced the difficulties of identifying the kidney which is in connection with the fistula. The following is a case in point: A woman who had undergone vaginal hysterectomy by a distinguished gynæcologist recovered with an uretero-vaginal fistula. The patient was handed over to a distinguished general surgeon to be cured of this fistula. Efforts were made in a most careful manner to ascertain which ureter it was which had been wounded and become entangled in the vaginal cicatrix. These failing to afford definite information, the ureter of the suspected kidney was exposed through a lumbar incision and was temporarily ligatured. During this experiment, which was of course, made under chloroform, no urine escaped by the vagina, but a certain amount was withdrawn by catheter from the bladder at the expiration of a given time. The inference was that the ureter temporarily ligatured was the one involved in the vaginal fistula; so the corresponding

kidney was there and then excised. Imagine the surgeon's chagrin, and the patient's distress, the next day when it was discovered that, though she had lost a healthy kidney, the operation had not cured her of the fistula; for the wrong organ had been removed.

It is impossible for me here to describe the work done, or even to name the many workers in this field of experimental and clinical surgery. I can only mention briefly the most satisfactory plastic operations upon the ureter by vesical grafting. They may be classified as follows:—

1. Invaginating the fistulous aperture itself into the bladder after first incising the vesico-vaginal septum.

2. Grafting the ureter to the bladder through the vagina.

3. Grafting the ureter into the bladder by an extra-peritoneal route through an incision in the abdominal wall.

4. Grafting the ureter into the bladder by a trans-peritoneal or intra-peritoneal operation.

Since Simon first practised nephrectomy as the remedy for ureteral fistula, this operation has been frequently performed for this cause up to the present time. Tuffier, in a recently published communication, refers to twenty-four cases which he had collected. But with our present knowledge of the surgery of the ureter, nephrectomy for fistula has become in most instances, I do not say in all, an unjustifiable procedure. It ought to be reserved for quite exceptional cases—as, for instance, where the state of the kidney itself is prejudicial to health; or when the surgeon, having tried and failed, has given up the attempt to cure a troublesome and loathsome fistula by plastic operation.

Nephrectomy as a primary operation for surgical injuries of the ureter is quite unjustifiable; and as a secondary operation for these injuries it comes under the criticism just made upon it for the treatment of fistula.

As a remedy for movable kidney, nephrectomy has come and gone, never, it is hoped, to return.

In cases of limited suppuration, of circumscribed tuberculous disease, of innocent growths, and in certain injuries of the kidney, partial excisions are now being performed in place of nephrectomy.

In many instances of calculous pyonephrosis irrigation of the renal calyces and infundibulum, followed by suture of the kidney, has taken the place of nephrectomy.

In hydronephrosis a few laudable attempts have been made, and in a good proportion of them with success, to remove the cause of the obstruction by means of a plastic operation, and thus to spare the kidney.

In fact, the tendency of the surgery of to-day is to save as much of the kidney tissue as possible, consistently with the safety and well-being of the patient.

In this imperfect survey of the origin and progress of renal surgery, I hope I have succeeded in showing that whilst its origin was nephrectomy, its progress, especially during the last ten years, has been in the direction of rendering nephrectomy more and more an operation to be avoided.

LECTURE II.

RENAL CALCULUS: THE DIFFICULTIES AND ERRORS IN DIAGNOSIS IN THEIR RELATION TO EXPLORATION OF THE KIDNEY: UNSUSPECTED, QUIESCENT, AND MIGRATORY CALCULI.

MR. PRESIDENT AND GENTLEMEN,—To-day I wish to draw attention to renal calculous disorders. If I put them in the very forefront of surgical affections of the kidney, I do so for the following reasons:—

1. They are the most frequent and most painful of the surgical diseases of the kidney. Probably no disease, except acute tetanus, is capable of causing worse suffering.

2. Few operations in surgery are so successful as nephrolithotomy, by which a calculus is removed from a kidney which has not become disorganised by the calculus or otherwise. No great operation is followed by a smaller mortality. Nephrolithotomy gives absolute cure, saving the kidney from progressive destruction, and the patient from what at any moment may prove to be an imminent danger to life.

3. No disease gives rise to such a variety of morbid changes in the kidney as calculus; and none is more certainly fatal when allowed to progress without surgical interference.

4. Renal calculus, whilst slowly or silently destroying the kidney, often physically disables its victim by its unrelenting irritation, and its unyielding resistance to every form of medical and dietetic treatment.

5. Renal surgery will grow in confidence and in favour with the profession and the public as nephrolithotomy anticipates and displaces nephrotomy and nephrectomy.

I attempted to show, in the latter part of the first lecture, that nephrectomy is being rapidly restricted in its application as advances are made in ureteral operations. It may also be safely asserted that nephrotomy, at present the most frequent operation resorted to for calculous affections, will be required but rarely if nephrolithotomy is earlier and oftener performed.

Calculous pyonephrosis is the result of long-standing irritation and progressive destruction of the kidney, and there is no reason why it should ever occur if physicians would recommend, and surgeons would practise, early operations for stone in the kidney. That this is a consummation much to be desired is seen by comparing the mortality of nephrolithotomy with that of nephrotomy and nephrectomy for calculous conditions, as shown by the Tables at the end of this volume: the following figures are derived from them:—

	Cases.	Recoveries.	Deaths.	Percentage Mortality.
Nephrolithotomy . .	34	33	1	2·9
Nephrotomy	43	33	10	23·25
Nephrectomy . . .	17	12	5	29·4

Case 21 in the table of Nephrotomies and Case 16 in the table of Nephrectomies are excluded for obvious reasons.

6. Another reason why calculous disorders take so prominent a lead amongst the surgical affections of the kidney is because of the difficulties and errors attending their diagnosis. These difficulties arise from four chief causes:— 1. Several other renal and ureteral affections give rise to the same symptoms as stone. 2. Several diseased conditions of other organs cause symptoms which simulate those of renal calculus. 3. Symptoms caused by renal calculus may be transferred to other organs; or may be of a psychical order, with or without high temperature, and may not be referred at all to the kidney itself. 4. Calculi may be for an indefinite time masked, giving rise to no symptoms whatever, yet causing the while progressive destruction of the kidney.

When calculi have been previously passed, when well-marked attacks of renal colic occur, when crystals of uric acid or calcium oxalate are frequently found in the urine, and when the urine is intermittently mixed with a good deal of blood, or persistently contains a microscopic quantity, there are the strongest *a priori* grounds for thinking that a stone is present. This evidence is strengthened if attacks of colic and hæmaturia are readily induced by exercise or jolting, and readily subside with rest; and if a sharp pain or distinct

tenderness is always caused by bimanual examination of the renal region. In many cases, however, mistakes in diagnosis are bound to arise. Morbid conditions other than stone will be found, from time to time, in cases in which the character of the pain and the state of the urine point to calculus as the probable cause. These mistakes are apt to excite a prejudice against renal exploration; but the results obtained by those who have had large practice in renal surgery ought to correct this. The experience gained by operations has taught us much as to what the conditions are which cause symptoms typical of stone when no stone exists.

In 1892 I published some lectures on the conditions simulating renal calculus as verified by surgical exploration in twenty-eight cases. To these I now add sixteen cases, making forty-four in all. In a few instances a calculus was possibly in the ureter at the time of the exploration, because one was passed some little time subsequently. But in the greater number of the forty-four cases some other morbid state of the kidney was found and remedied. It is certain that the diagnosis of calculus, though incorrect, was advantageous to these patients, for the very reason that it led to the exploration, and in this way to the discovery of the true cause of the disease.

The expression "negative exploration" is often applied to every operation in search of renal calculus but which does not result in the discovery of a stone. This expression is very misleading. It is not a "negative" result to find and excise commencing foci of tuberculous disease; to fix a misplaced or freely shifting kidney; to open and scrape away half a dozen small abscesses or suppurating cysts; to excise a solid renal or perirenal tumour, or a tense cyst; to discover and give exit to blood, extravasated beneath the fibrous capsule, or pent up within the cavity of the kidney; to liberate a kidney hampered by tough adhesions (which in one of my cases were as dense and hard as cartilage) due to perinephritis, provoked by sprain or other injury or disease; or to detect and divide an ureteral stricture or obstructing valve. Yet these are some of the conditions which have been met with in the search for stone in the kidney, and which, in many instances, have been most successfully cured.

I have explored several cases in which the diagnosis was very doubtful, but the severity of the sufferings so intense that the patients have willingly submitted to an operation. The exploration has proved the absence of a calculus, but has revealed a degree of mobility behind the peritoneum, in what I have designated a cinder-sifting manner, altogether out of proportion to any mobility detectable by clinical examination; in some of them no mobility whatever could be made out by bimanual abdominal palpation. In these cases complete relief has been obtained by nephropexy.

In other cases I have found, instead of calculus, the kidney more or less displaced, and though little, if at all, movable, yet greatly engorged with venous blood, owing to distortion of the veins at the hilum. In other cases, again, the kidney has been swollen and congested with venous blood, obstructed by the pressure of tough and condensed perinephric cellular tissue. Dr. David Newman has reported a case of this sort (*Trans. Lond. Clinical Soc.*, p. 67, vol. xxxvii., 1897).

The relief which is given by the so-called "negative exploration," in cases such as I have referred to, is, to my mind, a striking illustration of the indirect benefits which nephrolithotomy has conferred on suffering humanity.

Another important class of cases in which the symptoms simulate renal calculus, is *ureteritis;* a disease to which more attention has been given both in France and Germany than in this country or elsewhere. As long as nephrotomy was limited to cases in which the kidney is converted into a great abscess swelling the ureter was never seen in the living human body. But since nephrolithotomy took its place as a recognised operation; and an exploratory incision, with a view to nephrolithotomy, has been considered justifiable, because proved to be safe, the morbid states of the ureter have, by degrees, come to be better known, and operative measures have been adopted for their improvement or cure. An illustrative case of this sort was published by Israel in 1893:* A young man aged twenty-eight had for eight years suffered from an urinary affection, which commenced with frequency of micturition. Soon, to this symptom was added acute attacks of pain in the bladder, and left renal colic of

* Berlin, *Klin. Wochenschrift*, No. 27, 1893.

extraordinary violence. He became, in consequence, almost a morphia maniac. After long futile treatment elsewhere, he came under Israel—thin, miserable, tormented by atrocious pains, which recurred many times a day. The clinical examination, in corroboration of the patient's account, left no doubt as to the presence of renal calculus; there were frequently blood and mucus, but no tubercle bacilli present in the urine; there was, too, tenderness in the left flank, and pain was caused by pressure upon the ureter throughout its abdominal course. Thus Israel felt called upon to explore for calculus, and did not doubt that he would find one in the kidney. To his astonishment there was none. He found the kidney small and soft; he incised its convex border, and explored the renal cavity which was dilated. The kidney was then sutured, the wound closed and rapidly healed, but without any amelioration of the symptoms. It therefore seemed clear that the ureter was in some way at fault, and Israel determined to explore it. Cystoscopic examination showed the orifice of the left ureter to be patent, and the bladder free of growth; but afforded no other information.

Two months and a week after the first operation he again explored the kidney, with negative result, and then through a curvilinear incision, prolonged towards the middle of Poupart's ligament, he discovered that the ureter throughout its entire length was extraordinarily hard, of nearly three times its normal diameter, and presented at intervals enlargements of quite cartilaginous consistence, adherent firmly to the surrounding tissues, especially in the region of the small pelvis. It was permeable from kidney to bladder; but there were at three places slight obstructions, due to thickened folds of mucous membrane, the result of ureteritis. The kidney, small and hydronephrotic, was removed. After the nephrectomy, the colic disappeared immediately, and, although a certain amount of pain persisted for eight days along the course of the ureter, and pus was detected in urine for many months, the patient quite recovered.

Israel makes the following comment upon the case: "I hope if, in such cases, this plan of procedure is followed the number of instances will more and more diminish, to explain which—in the event of no satisfactory cause for

the painful symptoms being ascertained—the unmeaning diagnosis 'nephralgia' is made."

I join with Israel in hoping that fewer cases will in the future be set down to nephralgia. I feel sure that cases of so-called nephralgia will become rarer and rarer, (1) if due care is used in the clinical observation of patients supposed to be suffering from renal calculus; (2) if proper care is taken in the selection of cases for operation; and (3) if a more thorough and methodical examination is made of the kidney *and ureter* than is, I believe, customary at present. I do not mean to imply that a calculus will be found in every case in which it is explored for; far from it! I think, on the contrary, a greater number of operations will be done than hitherto, in which no calculus is present. But, with the precautions just mentioned, these operations will prove to be negative only in so far as calculus is concerned. Other conditions will be found, sometimes one, sometimes another, which the operation will cure, but which without surgical treatment would have remained unrelieved, or have grown worse.

It must be borne in mind that the case Israel described occurred five years ago, and that a good deal of progress has been made in ureteral surgery since then. With the more complete examination of the kidney and upper end of the ureter, by eye as well as by touch, together with ureteral catheterisation, which ought nowadays to be employed, the state of the ureter in such a case as Israel's could be readily ascertained, and would be treated at once by primary nephro-ureterectomy by Israel himself, or any surgeon with experience in renal operations, unless the condition of the patient rendered a somewhat extensive and prolonged operation impossible or inexpedient.

I am not prepared to go so far as some who assert that all the "algias" are a cloak for ignorance; that nephralgia or renal neuralgia is a term without significance, "an expression to hide our inability to explain the cause of paroxysmal attacks of pain in the renal region."

I would certainly, with others, urge the necessity, in every case in which one is tempted to adopt this diagnosis, of being very watchful not to overlook anything which might lead to a more satisfactory explanation.

There are many conditions outside the kidney, as well as those connected with that organ, which give rise to symptoms suggestive of renal calculus, and are likely, stone being disproved, to be set down to nephralgia.

I have known instances of each of the following diseases being the subject of mistake: (*a*) Gastric ulcer; (*b*) malignant and tuberculous growths in the intestines; (*c*) intestinal adhesions, whether involving the renal pedicle or not; (*d*) aortic or cæliac aneurysm stretching the ureter or renal vessels; (*e*) spinal disease, causing perinephric suppuration; (*f*) vesical calculus; (*g*) abscess, and calculus in the prostate; (*h*) growths in the bladder; (*i*) ovaritis; (*j*) tuberculous disease of the Fallopian tube; (*k*) a gallstone in the cystic duct.

Still, there certainly are cases in which neither within nor without the urinary organs has anything been discovered to explain continuous discomfort, or attacks of paroxysmal pain in the renal region; and yet complete relief has followed an exploratory operation. These are the cases which we are apt to call nephralgia; and these the only operations which we can properly speak of as "negative explorations."

Nor do I think we must quite rely upon a statement, which has been put forward with some authority, to the effect that paroxysmal renal pain, or so-called nephralgia, is never associated with neuralgia in other situations, and has never been relieved or cured by anti-neuralgic remedies.

We do not get well-marked cases of the kind in this country, nor do I suggest that all the cases of renal pain which are cured by renal exploration are of malarial origin; but nephralgia of malarial origin would seem to be known in other countries, and there is reason, therefore, for thinking it may from time to time be met with in our own, in persons who have lived much abroad.

I recall a short but suggestive contribution to the *Medical Times* on "Nephralgia due to Malarial Poisoning," by an old pupil, Mr. F. W. Kirkham, formerly surgeon to the Royal West India Mail, and whose name is associated with a most successful case of ureterotomy for impacted calculus.* Mr. Kirkham therein reports the case of an engineer whom he was called to

* *Medical Times*, April 4th, 1885.

see when at Colon, in the Isthmus of Panama, who had twice suffered from intermittent fever. This young man (aged twenty-five) was seized suddenly with severe dull aching pain in the right loin, varied at intervals by paryoxysms of severe shooting pains extending down the corresponding thigh. After lasting about four hours they passed off, attended by profuse perspiration. Similar attacks occurred on the two following days, and again on the fourth day, when he was first seen professionally. Mr. Kirkham found the temperature 102·4°, pulse 108, skin dry, and tongue clean. There was no enlargement of liver, spleen, or kidney, but there was tenderness in the right loin. The urine, though alkaline, was free of any abnormal sediment.

Morphia relieved pain and promoted sleep, and 20 grs. of quinine prevented the recurrence of the attack on the following day, and 15 grs. of the anti-periodic drug had the same effect on the day after. As soon as the quinine was discontinued, the attacks recurred, but a return to the quinine, and subsequently a change of climate, enabled him to enjoy perfect health. Mr. Kirkham adds: "During the past two years I have had four patients under my care who, after recovering, or during their recovery from, malarial fevers, have been seized with daily recurring attacks of pain in the region of the kidney, presenting symptoms very like those due to the passage of a renal calculus. In the case here recorded, it was the history of the case, the previous attacks of fever, the periodical recurrence of the symptoms, and the heightened temperature during the paroxysms, that led me to deem it due to poisoning from malaria, and its speedy yielding to the anti-periodic treatment will, I think, justify me in diagnosing it as a case of nephralgia due to malarial poisoning."

Tiffany of Maryland (*Trans. Amer. Surg. Association*, vol. xii., p. 113, 1894) speaks of having seen a number of cases of malarial hæmaturia, in which, it would seem, a history of intermittent or remittent fever was often wanting, but the patients had a sallow complexion, which might wrongly have been attributed to the affection for which surgical relief was sought. His remarks lead one to suppose, though he does not actually say so, that he has proved the malarial origin

of the hæmaturia and pigmented urine in some of these cases, by finding the plasmodium malariæ in the blood. If renal pain be associated with the hæmaturia, and the microbe of malaria be not looked for, or not found, the diagnosis of renal calculus would be almost sure to be made.

Another ingenious suggestion to explain certain cases which simulate renal calculus has been advanced. Mr. Howard Marsh (*Clinical Trans.*, vol. xxv., p. 195) in 1892 reported the case of a woman, aged twenty-five, who, from the age of thirteen, suffered pain in the *left* loin; and, when under observation, had paroxysmal attacks of pain, pyuria, and hæmaturia. Nephrectomy was followed by relief of these symptoms; the left kidney, which was excised, was small, movable, and contained three stones about three times the size of a grain of wheat. Within two months after the operation she began to suffer severe pain in the *right* kidney, with hæmaturia and scanty secretion of urine, and frequent and painful micturition—all symptoms which are suggestive of renal calculus. The case further simulated stone, because she passed a small calculus on one occasion, and two small pieces of calculous material on another.

This affection of the right kidney continued for over four years, during which time the right kidney and ureter were twice explored for stone, but with negative result. She died after the second exploratory operation, and at the *post-mortem* examination no calculous or other renal condition was found to explain the symptoms.

Mr. Marsh suggests that the case is one of the nature of Raynaud's disease—a neurosis, in which there is exaggeration of the excito-motor functions of the spinal cord, just as there is in symmetrical gangrene—and that the symptoms are due to a profound disturbance of the vaso-motor system of the kidney, just as the symmetrical gangrene is to exaggerated vaso-motor disturbance in the fingers and toes, and other peripheral parts.

If this view of the occasional causation of symptoms, which are usually regarded as pathognomonic of stone in the kidney, be correct, it may have considerable importance in explaining certain cases of mistaken diagnosis which at present are inexplicable.

There are, however, difficulties in the way of accepting it as the explanation of the case in point, namely:

(1) There was in this case unquestionable proof of small calculi in each kidney.

(2) There was a little dilatation of the right ureter, which was bound down by fibrous tissue near the cæcum.

(3) There were general adhesions in the right iliac fossa, and an open ulcerated appendix cæci.

(4) There were many old adhesions around the uterus, fixing it to the neighbouring parts.

(5) The right kidney, described as "large and pale, but otherwise healthy," does not seem to have been submitted to microscopical examination.

To me it would seem more probable that the vaso-motor disturbance (if this, and not chronic interstitial nephritis, was the cause of the symptoms) was not an idiopathic disturbance, but was due to the irritation of calculous particles; of the fibrous adhesions near the cæcum; and of the old adhesions about the uterus. That, in fact, there existed a combination of causes of irritation of the vaso-constrictor nerves of the kidney and ureter which produced pain, hæmaturia, and reflex suppression of the function of the kidney; in other words, that the nature of the case was the same as the paroxysmal attacks of renal colic due to irritation by stone.

Hopes were entertained that the Röntgen rays would be of service in determining the presence or absence of renal calculi, but hitherto they have afforded but little help in this direction. In time, possibly, they will be able to render more assistance than heretofore; but if they demonstrate with certainty the presence of a calculus without being also able to reveal the other morbid conditions remediable by operation, which mimic calculus, they will, I fear, be the means of putting back renal surgery by deterring many patients from submitting to surgical explorations, who can be cured by no other treatment than an operation.

"UNSUSPECTED RENAL CALCULUS."

I have pointed out that there are numerous morbid conditions other than renal calculus which cause typical renal

colic. Conversely, there are many cases in which the symptoms, due to renal or ureteral calculus, are not referred to the kidney or ureter at all, but to some other organ. It is also well known that a calculus for a long time may cause no symptoms whatever.

If such silent, lurking calculi could be discovered and removed, many deaths from calculous anuria, much illness and suffering from perinephric abscesses and renal fistulæ, and many kidneys gradually undergoing atrophy or disorganisation, might be saved by well-timed operation.

Unsuspected calculi group themselves into two classes—those which do not excite symptoms; and those which cause symptoms which are not referred to the kidney or ureter.

A. **Calculi which do not cause symptoms.**—I might quote several cases in which a calculus, after existing for years, has set up perinephric abscess, without having previously caused any definite renal symptoms A typical case of the kind is recorded, and the calculus illustrated on pages 220 and 221 of my book "Surgical Diseases of the Kidney" (1885).

A calculus may grow silently to such a size as to be felt on palpating the abdomen without causing any subjective symptoms.

I have met with three or four such cases. I will epitomise one of them.

In May, 1894, I saw a Mrs. B., aged twenty-seven (with Dr. Ford Anderson), who for two or three years had suffered from pain and sense of weakness in her back, more especially in the left side. The urine had never contained blood so far as she knew; she had never suffered from frequent or painful micturition, nor had there been any noticeable variations in the amount of urine excreted. She had gone into society, and danced, without more inconvenience than a rather undue sense of fatigue afterwards.

About four weeks before I saw her she began to pass muco-pus in alkaline urine; and five days before, she was seized with violent pain in the left renal region, which lasted many hours, in spite of morphia injections.

Following upon this attack were several rigors, a temperature of 105°, more or less continuous pain in the left side, and some fulness in the left flank. Dr. Anderson now

had a consultation with Dr. Fenwick; and on the following day I saw her with the view to an operation.

She was extremely ill with a hectic flush on her cheeks, widely dilated pupils, a small, rapid, weak pulse, a furred tongue, and very marked nervous depression and anxiety. She complained of pain over the left kidney; but had never felt pain, and was quite unaware of anything wrong in the right kidney. There was no pain elsewhere, though she replied, in answer to questions on this point, that "*she felt as though she might have pain anywhere.*"

There was no tenderness about the *right* kidney, and little if any about the left; but the *left* could easily be made out by bimanual examination, and was felt to be rather larger than normal.

On the *right* side there was a hard, irregular swelling plainly to be felt in the loin and through the anterior abdominal parietes. The antero-internal margin of this hard lump was bluntly conical, and the apex of the cone had a projecting rim surrounding a little ball the size of a pea. In front of the lump there was resonance, but not behind it. The tumour did not make the loin in the least prominent, but it could be readily pushed from before backwards. It had very little movement in the vertical or side-to-side directions.

The position of the lump as felt from in front was distinctly below the liver; the bulk of the kidney being situated about midway between the border of the thorax and the anterior superior spine of the ilium, and its lower end and inner border being continuous with the hard mass. It scarcely moved on deep inspiration, but fell forwards and almost projected the anterior abdominal wall in the knee and elbow posture. The temperature on the morning of my first visit (May 16th) was 101° F.; overnight it had been 105° F. Some urine, passed during the visit, was alkaline, of a muddy yellow colour and gave marked reaction of albumin. Microscopically there were numerous pus corpuscles, a little blood, some epithelium like that of the renal pelvis, and many rhomboid crystals of triple phosphates.

Through an incision in the right semilunar line the *left* kidney was made out to be larger and more globular in form

than normal; it was not soft or flaccid, nor could any calculus be felt in it. It was quite impossible to be sure that the enlargement was due to anything other than simple hypertrophy. Had it had the feeling of a hydro-nephrotic kidney, or of a calculus, I should at once have opened it through the left loin.

At the inner and lower border of the right kidney was felt a lump which was obviously a large calculus filling the infundibulum and projecting into the upper part of the ureter.

Through an oblique incision in the *right* loin, a calculus weighing 830 grains was removed; it had several branches extending in different directions into the substance of the lower portion of the kidney and to which the renal substance was intimately adherent. When the lower half of the kidney and the tumour were thoroughly exposed to view, I cut through a thin layer of renal tissue at quite the lower end of the kidney. With my finger I freed a great part of the calculus and drew it out of the wound; it was then seen that the bulk of the calculus was covered by a distinct fibrous capsule, which had to be incised and literally peeled off the calculus. This capsule proved to consist of the renal pelvis and the dilated upper end of the ureter, which were drawn out through the incision in the renal parenchyma with the stone, much like a glove is pulled inside out with the finger tip still in its stall. No pus was seen during the operation.

A small piece of the renal secreting substance which was torn away with the calculus was examined microscopically. It showed that there had been chronic irritation and increased tension within the urinary tubules; and arterio-sclerotic changes in the organ. Marked infiltration, with round and oval cells, of the interstitial tissue and Malpighian tufts was evident. The glomerular capsules were much thickened and their epithelial lining greatly proliferated. In places the glomeruli were undergoing hyaline degeneration. The arteries showed marked thickening of their inner and adjacent parts of their middle coats. There was fatty degeneration of the epithelium of the convoluted tubules, and in places the tubules were obliterated by the interstitial overgrowth. The straight tubes were dilated and in many

cases were without epithelium. Here and there patches of the renal tissue were undergoing coagulation necrosis.

No sutures were used for closing the wound in the infundibulum and ureter, because their walls seemed too thin, from overstretching, to hold them. The patient recovered very well from the operation, but with an urinary fistula; and the urine which was passed by the urethra remained unaltered in character, viz. sp. gr. 1010 alkaline, and having a muco-purulent deposit, which under the microscope showed blood, pus, crystals of oxalate of lime, triple phosphates, and numerous staphylococci. I was therefore compelled to the conclusion that there was a calculus in the left kidney which had been the real cause of the left-sided pain and feverish symptoms, and was still keeping up suppuration in the left renal cavity. This opinion was confirmed, and hopes of permanent recovery were encouraged, by the fact that three months after the operation—viz. in August, 1894—after three hours of severe paroxysmal pain in the left renal region, a stone the size of a small nutmeg was voided naturally. The subsequent course of the case was very disappointing and distressing, and may be briefly summarised as follows:

As the right-sided fistula continued, a second operation was performed—on November 28th, 1894—upon the right kidney, and two small calculi, and what looked like a fragment of the original calculus, were removed from the upper end of the right ureter, just beyond its junction with the renal pelvis. The fistulous track led directly down to an opening in the pelvis of the kidney, and thus to these calculi. Several drachms of stinking pus were evacuated from the upper part of the kidney through an incision in the convex border. The interior of the kidney was well irrigated, a drain tube was introduced, and the parietal wound closed by sutures.

Much improvement followed this operation, but the fistula did not close; and the urine passed *per vias naturales* (about thirty ounces per day) always contained pus. Improvement was maintained till Monday, January 21st, 1895, when, for the first time since August, when the calculus was passed by the urethra, she was seized with great pain in the left renal region, and had a high temperature. The relation of pain to micturition was this: one ounce of urine was passed at

10 a.m.; at 4 p.m. it was thought a little more urine was voided when the bowels acted; at 5 p.m. pain commenced, at first of a dull aching character, then increasing in intensity, with a feeling of fulness in the left loin. All through the night of January 21st and the following day and night, scarcely any urine was passed naturally, and the pain continued very severe. On the morning of the 23rd at 5.30, four and a half ounces were passed; at 8.30, six ounces; at 10 o'clock, six ounces; and so onwards; and the pain gradually passed off. During the hours when scarcely any urine was being passed by the urethra there was a free flow of urine through the fistula in the right loin.

On Friday, January 25th, a very similar attack came on, but was of shorter duration, and passed off with the re-establishment of the secretion of urine by the left kidney on the evening of the next day, January 26th. During both these attacks there was distinct fulness and hardness of the abdominal muscles over the left kidney.

The urine passed by the urethra during these attacks was very thick and offensive, and contained much pus. It was not certain whether the small amount of urine voided during these attacks came from the right kidney, or from the left; but it was quite clear that the right kidney was doing fair work, whilst the action of the left was believed to be all but suppressed, and the left ureter partially or entirely occluded.

On February 2nd, 1895, another similar attack commenced, only ten ounces of urine being passed naturally; on February 3rd, only six and a half ounces was passed; on February 4th, only one ounce, and none subsequently. On February 7th, I was again consulted, and I found the patient with flushed hollow cheeks, small feeble pulse, an urinous odour in the breath, a subnormal temperature, vomiting, and complete loss of appetite. There was a large tumour on the left flank. I told the friends the patient was rapidly sinking, and would soon die if the cause of the obstruction in the left kidney was not removed; that an operation afforded the only possible chance, and that a very slight one, considering the advanced degeneration of the parenchyma of the left kidney, and the prolonged anuria. Sanction was given for the operation on the following

day (February 8th), and then it was ascertained that the kidney was almost entirely destroyed. After cutting through the thin abdominal walls, the kidney, which was tightly distended and bulging against the fascia, ruptured as soon as the support was removed by incising the fascia. Between 2 and 3 pints of the most fœtid purulent urinous fluid escaped, then with my finger within the renal pelvis, I extracted an elongated almond-sized calculus, which was tightly plugging the upper end of the ureter. The kidney was enormously sacculated, and a large branched calculus was removed in three fragments from some of the upper sacculi. The interior of the kidney was flushed with warm water and drained, and the wound closed. The operation occupied less than three-quarters of an hour. Brandy and strychnine were administered, but the patient never rallied, and died the same afternoon.

It was, I believe, little more than a coincidence that after the first operation on her right kidney, the patient lost all her pain on her left side; and on the second day felt so much better that she described herself as feeling "quite a different being."

I think the relief she felt was owing to the stone, which was blocking the left ureter, slipping back into the renal pelvis during the movements requisite for the operation, or under the relaxing influence of the anæsthetic.

It was plain, for the following reasons, that the pus in the urine, both before and after the nephrolithotomy, must have come from the left kidney: (1) the urine remained unchanged by the operation; (2) the right ureter was completely blocked before the operation by the large stone removed, and to which the whole infundibulum was tenaciously adherent; (3) after the operation all the urine secreted by the right kidney escaped through the lumbar wound; (4) there was no pus found about the stone in the right kidney.

It is also equally certain that the calculi which were, later on, removed from the left kidney had been the cause of the feverish and nervous, as well as of the urinary, symptoms; and that I had, so to speak, operated upon the wrong organ.

This arose through my following the teaching, to which a good deal of importance was attached by the distinguished operator who originated it, namely, that a stone in one kidney may cause pain to be referred to the opposite kidney, without itself being the seat of pain; and that if the abdominal route is taken, we shall be able to avoid operating upon the wrong kidney, by finding out by direct palpation in which organ the stone is really situated.

In this particular case, cœliotomy was not needed to discover the stone in the right kidney; this was ascertained at the bedside. On the other hand, it did not enable me to ascertain that the left kidney contained one large branched calculus, and two others of smaller size which I removed at a subsequent operation, nine months after the first; nor a calculus which was passed naturally from the same kidney, during convalescence from the first operation on the right kidney.

The left kidney, with the hand in the abdominal cavity, was felt to be enlarged, more or less globular, and of uniform firmness. It was very carefully palpated for stone, but nothing was felt beyond what was consistent with simple hypertrophy.

Fifteen years ago, in a paper published in the *Royal Medical and Chirurgical Transactions* (vol. lxviii., p. 75 *et seq.*), I called attention to the uncertainty of ascertaining the presence of a calculus by direct palpation of the kidney, either with the hand *in the abdominal cavity*, or after the kidney had been removed from the body. In the *Clinical Society's Transactions* of 1887 (vol. x., p. 109) I again referred to the same probability of error. Further experience has convinced me of the fallacy of this mode of examination, and I would lay it down as an axiom, that the kidney which ought to be first explored is the one on the painful side.

I shall refer further on (pp. 65 and 101) to a case of calculous anuria, in which calculi could be felt through the abdominal wall in the right kidney, but the attacks of pain associated with the anuria were referred to the left kidney. I operated upon the painful side, found a small stone in a large, hypertrophied kidney, and the paroxysms of pain and anuria ceased entirely, and the kidney which was doing all the work was thus saved from advancing destruction.

I have been once or twice tempted to follow the teaching of the surgeon referred to, but, excepting on this one occasion, I have resisted. In Case No. 9, Table I., the inducement was very strong. The nature of this case was, in many respects, similar to the one I have just related. I was able to feel a stone in the right kidney through the abdominal walls. I removed it through the right loin; it weighed 1,303 grs. The young woman recovered, with an urinary fistula. Nearly twelve months afterwards she returned, complaining of terrible pain in the *left* kidney, but none in the right. At a consultation with several of my colleagues, the opinion held was that the left-sided pain was reflected from the right kidney; and that right nephrectomy should be done, more especially as this operation would get rid of the fistula in the right loin. Not believing in this kind of reflected pain, I ventured to act contrarily to this opinion. I explored the painful kidney, and extracted therefrom a stone weighing 513 grs. The girl rapidly recovered from the operation. Fifteen months later I removed the right kidney, because it became distended and suppurated. The patient recovered well, and was cured of the sinus in the right loin. Sixteen months after this last operation (the nephrectomy) she was known to be in good health; her left kidney, from which the stone of 513 grs. had been extracted, discharging its excreting functions well. One is tempted to ask, "What would have happened had I nephrectomised the right kidney before freeing her left kidney of the calculus?" My own experience of nephrectomy in other cases where there was a stone in the opposite kidney, compels me to answer "*Probably, death.*"

There is not, so far as I know, any case on record in which there is completely satisfactory evidence of symptoms on one side only being caused by a stone in the kidney of the opposite side. The presence of a stone on one side is not proof that the opposite and painful side is not also affected. That the attacks referred to one side have ceased after operating upon the opposite and painless side is not conclusive. This may be a coincidence, and due to the accidental shifting of a calculus in the painful kidney, or to some other cause.

Of course it may happen that with a great deal of disease

on the painful side there may be silent or quiescent disease on the opposite side, as in the cases I have just quoted, and this quiet disease may be so advanced as to cause a fatal issue after operating on the painful side; but this is an entirely different question. In several of the fatal cases in my lists of nephrotomy and nephrectomy for stone the opposite kidney has been proved, by *post-mortem* examination, to be disorganised by unsuspected calculus. This was so in cases in Nos. 11 and 22, Table II.; in No. 4, Table III.; and was, I have no doubt, so, though not verified by *post mortem*, in No. 15, Table III.

It may be asked, "Is it consistent to reject the theory of transferred or reflected pain, as applied to the opposite kidney, and yet to accept it when applied to the bladder or to the ovary?" Well, I believe it is so. I have verified the one and have not seen any proof of the other. I do not attempt a full explanation of this; but I would point out that there are instances of a nerve connection between parts on the same side of the median line more direct than between similar organs, or parts, on the opposite sides of the body.

Take, for example, hip disease—how often does it give rise to reflected or transferred pain in the opposite hip-joint? Yet it is not rare for it to cause pain in the knee of the same side. How often does a decayed molar cause pain in the sound molars of the opposite side; or an obstinate ulcer on one edge of the tongue cause pain in the healthy tissue of the opposite edge? Yet the decayed tooth will keep up eczema in the ear hole of the same side, and the lingual ulcer racking pain there, so long as the tooth is not extracted and the ulcer not healed.

The eye is often quoted as a parallel with the kidney in this respect, but the anatomical relations of nerves and vessels respectively of the two eyes are quite different from those in the case of the kidneys.

The anatomical communications between the kidney and the bladder, and between the kidney and uterus, as well as between the kidney and ovary and Fallopian tube of the same side, are much more important from the point of view of transferred impressions than those between the two

kidneys. The half of the bladder may be regarded as an expansion of the lower end of the renal duct of the same side; and any irritation from a cause seated in the kidney may be conveyed to it by continuity of structures. The blood vessels to the ovary and tube, as well as the uterine vessels, are in close relation with the ureter of the same side. Moreover, the ureter has a considerable course within the folds of the broad ligament, and not far removed from the neck of the uterus; and any drag or tension on the cellular tissue within the ligamentous folds is calculated to irritate the ureter or *vice versâ*.

I have no doubt that movable kidney causes certain uterine and ovarian symptoms; and in some cases of very great mobility of kidney I have felt a greatly thickened and tender ureter through the vaginal roof. In one case it was so thickened and indurated that it felt like an elongated stone. It is acknowledged that some movable kidneys, and I believe also some kidneys not movable, swell and ache during the catamenial period: in a case within my knowledge a movable kidney did so to the extent of being mistaken for a malignant renal tumour by a very noted obstetric physician. The kidney also occasionally undergoes grave and even alarming inflammatory processes during the early months of pregnancy, even where there is no peri-uterine inflammation; and did time permit I would quote cases in proof.

In parametric and perimetric inflammations, albuminuria and pyuria are far from rare, and may assume alarming proportions. They occur in non-puerperal as well as puerperal cases, though much more frequently in the puerperal. These urinary changes are not due to vesical, but to renal conditions; occur during the parametric and perimetric affections, and subside with them. And as showing the influence of the peri-uterine cellular tissue upon the ureter and through the ureter to the kidney, I may point to the fact that in the late Matthews Duncan's experience (*Med. Chir. Trans.*, vol. xlvii. p. 274) albuminuria is much more frequently associated with parametritis, *i.e.* inflammation in the pelvic cellular, than with perimetritis, *i.e.* inflammation of the peritoneum of the broad ligaments and uterus. It is also well known that in parametritis the inflammatory process has a strong preference for

spreading along the ureter to the kidney; and having done so, not rarely gives rise to perinephric abscess.

B. **Unsuspected calculi with symptoms transferred to other organs.**—If the reasons above stated are correct, there is no cause for surprise that with renal calculus, as with vesical calculus, hip-joint, and spinal diseases, pain may be referred to a distant part instead of to the organ affected.

In renal calculus the symptoms may be referred to the bladder, ovary, uterus, or testicle, instead of to the kidney.

I am constantly seeing cases of renal calculus and other renal diseases which have been under prolonged and repeated treatment for cystitis. Bladders are frequently sounded, irrigated, injected with solutions of silver nitrate, and otherwise actively treated, without apparently the least suspicion that the trouble is due to stone in the kidney. I will mention one very striking instance, in which for nearly ten years all symptoms pointed to the bladder, none to the kidney; but at length a renal calculus was removed, and the patient regained perfect health.

A married woman (No. 19, Table I.), aged thirty-five, leading an active life, and of a physically and mentally healthy constitution, had suffered from very painful micturition, cystitis, and frequent phosphatic concretions in the bladder for two years. All the tried remedies having failed to give relief, a vesico-vaginal fistula was established by operation, and the urine was allowed to flow away continually into an urinal. This state of things went on for some years, and then the vesico-vaginal fistula was closed. No sooner had this been successfully accomplished than all the old symptoms returned, so that in two or three months the fistula had to be re-established. In this condition the patient passed over nine of the best years of her womanhood. Then some pain and some extra resistance were experienced in the right renal region, and after four or five months' duration I was asked to see her by Dr. Fenton, who had diagnosed right renal calculus. I endorsed this opinion, and on May 14th, 1893, I removed a small lozenge-shaped uric acid calculus weighing only 4 grs., through an incision in the convex border of the kidney. The patient made an uninterrupted recovery; and when quite convalescent from the nephrolithotomy, Dr. Fenton closed

the vesico-vaginal fistula. The patient remains well to this day, has perfect control over her urine, and, as she expresses it, "finds her life quite a different thing, and is now well worth living."

It is sometimes the same with the ovary as with the bladder; it receives all the attention and treatment, whilst the cause of the trouble is in the kidney. I altogether exclude in these remarks cases in which there is some morbid, organic or functional state of the ovary as well as of the kidney. I refer exclusively to instances in which pain, either paroxysmal or constant, is referred to the healthy ovary, not to the kidney, and may be associated with tenderness in the hypogastrium, or per vaginam, and yet is caused by renal calculus or gravel.

I have had under my care a young married woman who has suffered from abdominal pains for two years. (See Table I., No. 34.) Up till a few months before I saw her she had been treated for ovarian inflammation, but whilst under a gynæcologist of repute in October last, calculus in the left kidney was diagnosed. If correctly reported, this gentleman was of opinion that an operation for its extraction was very dangerous in her particular case. When she came to me there was almost continuous pain in the *left* renal region, with frequent and severe attacks of renal colic. During the attacks a swelling formed in the left side of the abdomen, and no urine whatever was excreted. Of late the attacks had lasted three days, and recurred two or three times in a fortnight. On examination, the *right* kidney was felt to be very hard and rather larger than normal, and stones could be made by manipulation to grate upon one another within it. I believe the right kidney to be quite useless, yet she has never felt any pain in it, nor had occasion to think it is the bed of a large stone. This case illustrates two points: (1) the transference, for a long time, of pain to the ovary from the left kidney; (2) the absence of any symptoms whatever referred to the right kidney, though stones within it could be felt through the abdominal walls.

Abscess of traumatic origin, or stone in the kidney, may give rise to symptoms which are erroneously ascribed to misplaced or deflected uterus. I have erased parts of the kidney of a lady of thirty years of age for two small abscesses of

traumatic origin, in each of which there was a calculous mass. Yet this patient had been treated since her twenty-second year for misplaced uterus, and had worn pessaries during that time. There was, however, no real abatement of her symptoms till after the operation on her kidney.

C. **Unsuspected calculi with high temperature and great psychical disturbance.**

This third group of cases is well illustrated by the following, the patient being desperately ill for two or three months with symptoms of a typhoid type, attended with acute but vague pains over the whole body, and with great mental prostration; the illness terminating after the discharge, presumably from the left kidney, of a few ounces of pus and some renal calculi.

On June 16th, 1893, I saw, with Dr. Ewart of Eastbourne, a Mr. C. from Alexandria, where he occupied a position requiring great mental and bodily activity. For a few days before sailing for Europe he was not feeling well, and on his arrival at Brindisi he was so ill and in such pain when moved that he was screaming the while he was carried ashore.

With great difficulty and several halts he reached Aix, where he became too ill to go further. His symptoms whilst at Aix were high fever, frequent rigors, and, as he himself described them, excruciating pains all over him. Sometimes the pains were worse at one part, sometimes at another, but there was a slightly marked predominance on the left side of his trunk and left lower limb. His urine was turbid, alkaline, and offensive, and contained pus. It was suggested that he might have a renal calculus, but there was no indication in which kidney it was.

Accompanied by Dr. Ewart he at length reached London, though once or twice during the journey it seemed impossible he could do so alive. Frequent doses of morphia had to be given to relieve pain.

When I saw him on his arrival in London he was emaciated to a marked degree, was hectic, and had a high temperature with extreme, general hyperæsthesia.

He was tender, and complained of pains all over him; cried out or groaned when touched; but at one time he would complain most bitterly of a part which at another time seemed

free of pain, and could be handled without hurting him. He was shockingly depressed, would take no food willingly, and lay always in a lethargic state, except when touched or moved, which he often tearfully resented. By his relatives he was seen to be quite changed, his temperament altered, his nerve and moral courage lost. He was a different man, they said. The urine was 1015, turbid, alkaline, very offensive, depositing an abundant whitish sediment, and contained a distinct but not a large amount of pus, many of the pus cells undergoing fatty degeneration. There were neither blood corpuscles, sugar, tube casts, nor tubercle bacilli in the urine. On the following day I examined him under an anæsthetic. Nothing abnormal was detected about his bladder, prostate, or urethra, nor in any part of the pelvis or abdomen. There was no undue fulness or hardness of either kidney to be felt.

Drs. Cayley and Ringer saw him on three or four occasions with me, but we were unable to come to any definite diagnosis except that there was some focus of suppuration somewhere within range of the genito-urinary organs, but precisely where we were unable to say. On the whole, it seemed most likely to be in the left kidney; but with this uncertainty, and in the serious febrile and exhausted state of the patient, I was unwilling to urge an operation, which the physicians by no means encouraged either. He improved but little during his stay in London, and on July 15th he was removed to his house at Eastbourne.

On September 18th and 23rd, 1893, Dr. Ewart wrote: "C. had been going on much as before, always high temperature during some part of the day, pulse bad, feet swelled, and I did not like the look of him; the urine became quite sweet (but always alkaline or neutral) under the use of carbolic acid. Some three weeks ago" (*i.e.* about August 28th) "the temperature went to 103° F. after a severe rigor, and kept about the same for fifty-eight hours. He then passed six ounces of urine and one ounce and a half of pus, and two days afterwards he passed a good-sized stone. Since then he has done well; but even now there is an indication of the temperature going up again. I cannot help feeling pretty sure there is mischief going on in the kidney still. He eats well now and goes out daily. I never found any swelling of either kidney,

but I have no doubt the left is the one affected. Personally, I think the man's hysterical condition masked his real symptoms to a great extent. His temperature has never been over 99° since he passed the stone and the pus in the urine a month ago. He has put on ten and a half pounds in weight since then." On Sunday, October 8th, 1893, Dr. Ewart wrote: "On Friday (October 6th) C. passed a good deal more pus, and yesterday four little stones came away without any particular pain. C. himself is gaining flesh and doing well, and sails on the 20th for Alexandria. His temperature is normal; his urine contains albumen; he passes sixty ounces a day. Perhaps he ought to have an exploration made, but I can't help thinking a ureter which has been sufficiently dilated to be travelled by the large stone is a very effective drain to the kidney."

He returned to his duties in Alexandria on October 20th, 1893. He quite recovered, and was seen by Dr. Ewart in August last (1897) in excellent health, and quite his natural self.

A very similar but not so extreme a condition of high temperature and mental disturbance occurred in the case above quoted (Table I., No 22); also in the woman whose case is No. 14 in Table VII. This latter patient had had a calculus removed from the left kidney before she came under me. I removed a cyst and a tuberculous abscess from her right kidney, and in the following year closed the fistula remaining in the left loin after the stone operation. On both occasions, but especially the last, her nervous anxiety, depression, and terror, and the high temperature were very marked symptoms.

The same phenomena, it is true, mark other kidney affections. I have had a very striking proof of this in a lady (Table IV., No. 23) whose kidney I explored for calculus, but the condition found was an extensive subcapsular hæmorrhage caused apparently by a strain. This patient's illness, like Mrs. B.'s and Mr. C.'s, the two cases related above, was ushered in with fever, and quickly followed by the psychical symptoms; so that the operation had nothing to do in causing it. Mrs. B. improved rapidly after the operation. Mr. C. was not operated upon; but this lady with the subcapsular hæmorrhage became temporarily worse after the operation, and for a short time was melancholic and mentally quite deranged.

There are a few other cases in which I have witnessed marked nervous symptoms without high fever. In No. 21, Table II., the patient was quite melancholic, and, according to his sister's account, had become so depressed mentally, and so inert physically, that his relatives thought his nature had entirely changed. The night before his operation he spoke to strangers in the surgical home in which he was, of the certainty he felt that he would not recover. The operation went uneventfully, but when he came out of the anæsthetic, he was hemiplegic and aphasic. He died on the second day after the operation, and at the *post-mortem* examination thrombi were found in his cerebral vessels.

In my only fatal nephrolithotomy there was for many hours before the patient's death great restlessness with mental depression and agitation. And in a case (Table III., No. 3) in which I removed a kidney atrophied by obstruction from a stone impacted in the lower end of the ureter, the man's nervous anxiety and alarm were prominent features throughout, at any rate after his admission to the hospital.

It is a question whether the nervous and mental phenomena without fever are a peculiar form of uræmic brain symptoms; or whether the renal disease, like any other serious disease, is a direct cause of the psychical disturbance. The character of the disturbance is especially one of depression; melancholia, stupor, and nervous apprehension of danger being the most frequent forms.

Psychical disturbance has been often noted in Bright's and other renal diseases. I have seen it in advanced lardaceous disease, without any other affection, of the kidney. But in these disorders other unmistakable uræmic symptoms existed which have not been present in the calculous cases to which I am now alluding.

Another question is: why are these psychical disturbances in some cases associated with fever and in others not? Is it the result of some molecular transformation—excited by the local irritation—upon which the evolution of heat depends; or is it due to some special form of bacterial toxines?

Are there special micro-organisms which have a peculiarly disturbing and depressing effect upon the cerebro-spinal centres, and which find a suitable nidus in certain states

of the kidney or urine? Or are the ordinary pyogenic bacteria under certain circumstances so influenced by direct contact with the urine in the kidney as to become the cause of this psychosis? It can hardly be the latter, because one sees a greater degree of suppuration within the kidney, with the temperature as high and the temperaments of the patients much the same, but without the psychical disturbances to which I refer.

Nor can this disturbance be referred to uræmic poisoning. It occurs when there is no suppression of urine; and is absent in calculous anuria when no urine is secreted for six or eight or more days in succession. The temperature is low, not high, in uræmia. In one of the two cases (Mrs. B.) the temperature fell and the psychical disturbance ceased after removing a calculus from the non-suppurating, not from the suppurating kidney; in the other (Mr. C.) the symptoms passed after the discharge of some pus and a few calculi with the urine.

Perhaps light may be thrown on these questions by culture experiments with the urine, and especially with that removed direct from the affected organ.

QUIESCENT CALCULUS.

Quiescent calculus is little less dangerous to its possessor than the unsuspected stone. It is often said, "The stone may settle down and become imbedded in the kidney; or it may pass naturally, and then there will be no further trouble." But often this is not so. One of my objects in this lecture is to show that neither the one nor the other of these events can be looked forward to with perfect equanimity; and that in every case in which a stone is believed, or known, to be present the best course is to explore the kidney and remove the stone.

We ought not to close our eyes to the possibility of sudden danger arising from a hitherto quiescent calculus, or from one giving only slight and occasional reminders of its existence. If I am rightly informed, the insurance offices are wise enough not to do so; nor should the surgeon.

Several cases might be quoted of calculi quiescent for years giving trouble at intervals, and ultimately causing serious or fatal illness. I will refer briefly to two cases.

In November, 1894, I saw a captain in the merchant marine service, aged forty-eight (Table III., No. 11). He had hæmaturia first when a boy of twelve years old. For sixteen years, during which he was following an active seafaring life, he seems to have had no return of this symptom. In 1874 he fell down a ship's hold, and was supposed to have injured his kidney. Subsequently he had attacks, at long intervals, of pain in the right loin and hæmaturia, lasting a day or two. These attacks occurred in 1877, 1880, 1885, and 1894. Between the attacks there was no pain, and very slight, if any, blood in his urine; and he continued to follow his profession till June, 1894, when he retired. In July of this same year, after gardening a good deal, and otherwise exerting himself in an unusual way, he began to suffer from liver trouble, and in August was slightly jaundiced; at the same time, he complained of paroxysmal pain in the right lumbar region, without hæmaturia, but with a little albuminuria and a heavy deposit of phosphates from the urine. The lumbar pain at that time was not intense, but the right kidney was enlarged, and tender on pressure. In October and November the lumbar pain became severe and the hæmaturia copious and continuous. No pus had ever been detected in the urine.

Still a man of fine physique, he had, however, lost nearly a stone since the illness began. His complexion was very sallow, his face expressive of pain, his respirations very shallow, and he complained of excessive weakness and of feeling terribly ill. There was an enormous hard bossy fixed tumour in the right hypochondrium and right lumbar and inguinal regions, extending high up beneath the ribs, inwards to the linea alba, and downwards to the iliac fossa. The loin was not prominent; there was resonance in front, but only on the inner side of a line from the anterior border of the axilla. There was no demarcation between the tumour and the liver dulness; there was no œdema or varicocele.

The tumour, by two physicians who had been consulted, was considered to be a hepatic growth; and one of these physicians had no doubt that it was malignant disease of the liver.

I explored through the linea semilunaris, and ascertained that there was no growth, and that the liver was normal but

pushed far up, and that the swelling was entirely renal. I at once exposed the kidney through the right loin, and removed calculous masses to the weight of ten ounces and a large quantity of broken down grumous-looking blood. As the kidney bled freely and was entirely disorganised, and as, owing to its expanded size, and the tough, fibrous consistence of the renal tissue, it was very difficult to stop the bleeding by pressure, I rapidly clamped and then ligatured the vessels of the pedicle and removed the kidney. The kidney was nine inches in length and very much sacculated at each pole, as well as at the centre. These pouches had to be emptied of their contents—which consisted of old blood clot, and gritty sandy calculous matter—before the kidney could be removed from the body.

The displacement of this enormous mass, coupled with the deplorable condition of the patient before the operation, brought on collapse. Transfusion was performed, and for a little time he rallied and spoke; but he soon relapsed, and died within three hours from the operation, which occupied an hour and a half.

Here we have an unrivalled instance of the insidious course of calculus, and of the harm it works even when quiescent. There is no doubt the commencement of his calculous life dates from his twelfth year; yet this man goes for sixteen years without symptoms—at any rate, of sufficient importance to attract his notice or fix themselves in his memory; then, after an injury, symptoms began to show themselves, and recurred at very long intervals over a period of twenty years, during the whole of which time he was following one of the most arduous of lives. The calculus all this while was insidiously, unobtrusively gathering force; then in the meridian of his life, and just as he was able to retire from his profession, his latent enemy broke into open assault and caused his death within four months.

In February, 1896, I saw a patient in his forty-fifth year (Table II., No. 32) who gave the following history. "In 1865, when thirteen and a half years old, I received a kick over the left lower ribs, and the lowest two were broken. In 1877 I noticed a little blood in the urine, and following this a

creamy deposit. In 1879 I had a short, sharp attack of severe pain, lasting twenty-four to thirty hours, in the left side, with great shivering and sweating afterwards.

"At irregular intervals, up to 1891, I had attacks of pain in the left side, with rigors and sweating, followed by an immense quantity of pus in the urine. During this period I was on service in the Mediterranean, the Red Sea, and Australia. There was some pus always present in the urine, except just previous to a rigor, when the urine would become clear, and remain so till the sweating set in, when a lot of pus came away, and I got better. The whole attack would be over in twenty-four hours, or less. The attacks were often induced by hunting. In December, 1889, I got a fall from my horse, and after this had very marked hæmaturia for ten days. A physician in London who now saw me diagnosed a renal calculus, but said that an operation for its removal was out of the question. Previously I had seen some of the best surgeons in London, who had told me I had nothing the matter with my kidneys, but attributed my symptoms some to the bladder, others to the prostate. Since November, 1890, with more careful dieting, and being almost a total abstainer, I had only had two or three slight attacks up to the time you first saw me in February, 1896, and I was able to lie upon my left side, which I had not been able to do previously."

He thought nothing of walking twenty miles when in Africa in 1895, and he had had over five years of almost complete abeyance of symptoms, when, on February 13th, 1896, whilst hunting on a very restive horse, he felt something give way in the left kidney, and during the succeeding four days the kidney "kept filling," becoming more tender and painful, until he could neither walk, nor sit, nor lie down except in a coiled-up posture, and even so he was in great pain. There was at this time a tumour reaching to the linea semilunaris (left), extending high up beneath the costal margins and downwards below the crest of the ilium. Pulse regular, 76. Temperature normal. Urine was 1012, acid and contained albumen. The diagnosis was "left kidney blocked, opposite kidney working actively and healthily."

On February 21st I opened his left kidney through the loin and let out a large quantity of fluid blood and blood clot. A calculus weighing 260 grs., tightly impacted in the renal pelvis, was extracted through the incision in the convex border of the kidney. The kidney was converted into an extensively sacculated cavity, with a very thin wall, in places not thicker than a penny-piece. This shell of a kidney was not removed, because it was so adherent to surrounding parts and reached so high up beneath the diaphragm. The wound healed rapidly, and he left London for his home (on March 16th) twenty-two days after the operation, with a small sinus, which to my surprise healed a fortnight later.

All continued well, and he was "better than he had been for twenty years," when, on April 24th, in spite of cautions against riding and other exercises—till the kidney had had time to contract—he took part in the practice of a torpedo-destroyer from ten till one o'clock one day, the vessel travelling thirty knots an hour, and he subjected to the vibration, which was, of course, continuous and considerable. At two p.m. he felt chilly, his kidney swelled and became painful; feverishness and an evening temperature of 101° followed; and on April 30th, and again on May 2nd, the cicatrix yielded, and a large quantity of blood escaped on each occasion. A short pus-secreting fistula followed, and has continued up to the present; but he has long since been leading a very active life in command of one of H.M.'s ships, and declares himself in better health than ever.

I have a pile of letters and prescriptions from several eminent physicians and surgeons written to this patient between 1880 and 1891. They have been to me interesting reading; for, though honour is due to the writers of such careful and candid opinions, they evince the most absolute want of confidence in the efficacy and safety of the surgical treatment of stone; and its trial in this particular case was distinctly discountenanced. But how much better for the patient if the stone had been removed in 1880, before the kidney had been destroyed! He would thereby have been spared a very severe illness, which made an operation imperative, after all, in order to save his life; but was performed too late to save his kidney.

MIGRATORY CALCULI.

Lastly, I want to show the possible and actual dangers of leaving a calculus to make its own way out of the urinary passages.

And in this connection let me ask what would be thought of a surgeon who advised a patient with stone in his bladder to wait a few months and see if it would pass through the urethra naturally and unassisted, on the ground that it was only a little stone, and therefore would be able to make its way perhaps without, perhaps by dint of, stretching; that the process might be a very painful one, or might not; that when once the calculus got into the passage the force of the pressure of urine behind would be almost sure to drive it onwards, but that if it did not do so, or alarming symptoms arose due either to the over-distension of the organs behind, or to the sloughing of the part of the tube in which the calculus was impacted, then and then only resort should be had to an operation.

Well, this is precisely the line of argument daily acted upon in the case of renal calculus. And why? Not because less damage to the kidney will result from the obstruction in the ureter: on the contrary, the serious effect of a blocked ureter is much earlier and much more rapid in its progress; not because the suffering from renal calculus is less than from vesical calculus; not because extravasation of urine never occurs from obstructed ureter or renal pelvis, for witness the perinephric and periureteral abscesses and fistulæ: but because of the supposed risks to life of operation on the kidney. But this reason is really no longer tenable. No operation practised for vesical calculus has a lower mortality than nephrolithotomy, *i.e.* excision of a calculus from an otherwise healthy kidney. Nephrolithotomy is, when properly performed, no less free from after ill effects than lithotrity.

I have not been blameless in this respect. On the contrary, for years I made it a practice in cases in which the symptoms were slight, and of only recent occurrence, to treat the patients for a time on the expectant plan. I have advised many in this manner, and have often been gratified to hear of the subsequent successful passage of the stone. I have several specimens of this sort in my cabinet, but I am no longer proud of them; they are the emblems of what ought to be

very largely an obsolete treatment, and from which I have had one or two rude awakenings.

A patient, thirty-three years of age, had very slight symptoms of renal calculus; namely, occasional slight pain about the upper part of the left ureter rather than the kidney, and passage of urine, which, often as I examined it, was neutral, phosphatic, and microscopically showed blood and pus cells and small crystals of calcium oxalate. His custom was to come to England for the summer months and play cricket for his native county, and to pass the rest of the year in Queensland, where he had a large farm. During the summers of 1894 and 1895 (when he was consulting me) he played cricket and tennis regularly, in spite of occasional mild attacks of ureteral pain; and was quite unwilling to submit to any operation. Towards the end of the season of 1895 he married, and on the third day of his honeymoon, and a week or two before sailing for Queensland, he came to me in great agony, and unable to pass urine, in spite of frequent straining, due to a calculus impacted in the prostatic urethra.

It was, of course, quite easy to push the stone back at once into the bladder, draw off the urine, and later in the day perform lithotrity. In two or three days he was just as if nothing of the kind had happened, and was relieved of his calculus into the bargain.

But what would have become of this newly made husband had the same accident happened a few weeks later when, instead of being within a mile of a hundred able surgeons, he had been out in the bush without a doctor of any kind within two or three hundred miles of him; or if instead of the calculus lodging near the vesical orifice of the urethra, it had blocked the ureter where it crosses the brim of the pelvis, and this had occurred just after leaving port for a three or four weeks' sail? Either of these contingencies might have happened in his case.

This leads me to mention what did happen, in another case, from a stone blocking a ureter at this spot.

A man aged thirty-two, about two months after feeling pain in the right loin, had an attack of renal colic. The pain was very severe, lasted four hours, and was accompanied with retraction of the right testis, and hæmaturia. This occurred three weeks before I saw him.

After the attack, carriage or horse exercise, and any extra exertion, brought on severe pain in his right loin, accompanied by hæmaturia. His urine was 1010, and contained albumen. I advised him to go home and rest for a month, and if the pain continued, or the colic recurred, to have an operation. He did not rest long; but a week after rode on horseback, and carried a heavy bag along a station platform. Then he was seized with the most violent pain in the course of the ureter, where it crosses the pelvic brim, and a hard body, like a stone, could be felt there through the abdominal walls. After ten days of the most frightful suffering, during all which time the calculus could be felt in the same position, the patient declared he could bear his sufferings no longer. He made a long railway journey to London, and was operated by a London hospital surgeon. Cœliotomy in the median line was performed, and through this a small rough stone in the ureter was steadied between the finger and thumb of an assistant, whilst the surgeon performed retroperitoneal ureterotomy through a slightly oblique wound in the right ilio-costal space and extracted the calculus. What occurred afterwards was, I believe, this: both parietal wounds healed well, and an urinary fistula in the right loin showed signs of closing, when urine was extravasated into the pelvis tissues through the ureteral wound. No doubt the wall of the ureter where the stone had lodged was thinned and contused by the ten days' impaction of the rough-surfaced calculus, and so repair did not proceed in it after the calculus was removed.

This extravasation was followed by suppuration and by the discharge of pus per rectum and by symptoms of obstruction of the left kidney, owing to pressure upon the ureter by the inflamed pelvic cellular tissue. The left kidney was explored, and found to be greatly congested. No stone, only a few particles of gritty material, were found in it. A month or so later, when all seemed going well, a repetition of the symptoms in the left kidney took place, and a great extravasation of urine, requiring a large incision in the right iliac region, occurred.

A week later, as he was not making satisfactory progress, I was asked to see him. He had undergone three operations,

and now had four long scars, two on the front of the belly and one in each loin, with a fistulous track, from the injured ureter, opening in the right loin; and there was, I understood, another laparotomy contemplated, but this I hope was not done. Here was a case of a professional career checked, if not permanently ruined, by a little calculus weighing not more than two or three grains. A long convalescence certainly was before him; possibly, later on, the necessity of nephrectomy for a permanent fistula; or gradual destruction of the kidney from stenosis of the ureter at the seat of impaction and operation.

Such a case, even if but one in a thousand, teaches a grave lesson; and my reflections upon it, and upon that of the colonist above quoted, convince me that the expectant treatment—excusable because inevitable before nephrolithotomy was proved to be the safe operation it is—is no longer justifiable.

Summary.—The conclusions at which I have arrived are the following:

(1) That the aim of the surgical treatment of renal calculus should be to extend the application of nephrolithotomy, and thereby restrict the necessity of nephrotomy and nephrectomy.

(2) That more frequently than not, the failure to find a stone is not in reality a failure of treatment, because there are so many curable morbid conditions which mimic renal calculus, and which are discoverable only by exploration.

(3) That the theory that a stone in one kidney, whether that kidney is itself painful or not, reflects or transmits pain to the opposite kidney, is quite unproven; that it is a dangerous theory, calculated to lead to very erroneous practice; and that the surgical principle with regard to exploratory operation should be *that with pain, paroxysmal or continuous, on one side only, the kidney on the painful side* should be explored.

(4) That nephrectomy for calculous conditions is very rarely called for, and should be done only in most exceptional cases. Nephrotomy for calculous **pyonephrosis** is the proper operation—at any rate as a primary operation—because of the frequency of double calculous disease. Experience has shown

that kidneys from which stones weighing 830 grs. and 1,300 grs. have been removed, may be sufficient to maintain life during the blocking or suspended action of the opposite organ.

(5) That nephrectomy of a completely disorganised kidney, whilst the opposite organ is occupied by calculus, is almost certainly followed by death; whereas nephrectomy, after the opposite kidney has been freed of stone, and allowed some time to recover, will probably be followed by recovery from the operation and possibly by very good health subsequently.

(6) That when renal calculus causes reflected or transferred vesical or ovarian pain the removal of the calculus will be followed by complete cure of the bladder or ovarian symptoms.

(7) That in some cases renal calculous conditions are attended by very remarkable nervous symptoms, sometimes with, sometimes without, high temperature, and that information as to the cause of these symptoms is needed.

(8) That unsuspected renal calculi are a source of very real danger to their possessors; and when, whether by accident or by the systematic examination of the urine, we have cause to suspect the presence of a calculus, we should recommend its immediate removal, regardless of the fact that it is not causing renal or transferred pain.

(9) That quiescent calculus is as dangerous to the individual as unsuspected calculus, and ought to be removed by operation.

(10) That the hitherto accepted teaching, that a renal calculus, if causing only mild symptoms, even though extending over a lengthened period; or attacks of severe colic of only recent occurrence, should be treated on the expectant plan, ought to be discarded as unsound in theory and dangerous in practice.

(11) That the same principle should be applied to renal calculus which has long been the rule in regard to vesical calculus, namely, when suspected it should be searched for, when known to exist removed, without waiting in the hope that it may become encysted or spontaneously expelled.

(12) That the very low mortality of nephrolithotomy puts this operation upon the same footing for renal calculus as lithotrity in the most experienced hands for vesical calculus.

LECTURE III.

FISTULA CAUSED BY RENAL CALCULUS; OBSTRUCTIVE ANURIA DUE TO RENAL CALCULUS; THE TECHNIQUE OF THE EXPLORATION OF THE KIDNEY AND URETER FOR CALCULUS.

MR. PRESIDENT AND GENTLEMEN,—In the second lecture I endeavoured to show (1) that the errors and uncertainties in the diagnosis of renal calculus had in many instances been of distinct advantage, because they had led to the exploration of the kidney, and this in turn to the discovery and cure of various morbid conditions other than those due to stone. (2) That unsuspected, quiescent, and migratory renal calculi cause very destructive and even fatal consequences, and that we ought to revise our practice with regard to the early treatment of renal calculus. (3) That the low mortality of nephrolithotomy (*i.e.* the operation for renal calculus in its early stages), and the high mortality of nephrotomy, and the still higher mortality of nephrectomy (*i.e.* of the operations performed for the advanced disorders due to renal calculus), show the advisability of operating at as early a stage as possible.

In further support of this conclusion, I may point to Table IV., the exploratory operations, and Table V., the operations for movable kidney. There are forty-two of the former, and fifty-seven of the latter, with only one death which can in any way be attributed to the operation.

It will be seen in Table IV. that three cases are recorded as deaths (Nos. 15, 22, and 25), but a glance at the abstracts shows that the deaths were due entirely to other causes. Two of the patients lived long enough to absolutely recover from the operations, and ought to be counted therefore as recoveries; the third (No. 25) died from obstinate vomiting and hæmatemesis from a gastric ulcer on the second day after the operation, and therefore ought to be excluded.

In Table V. there is not a death from any cause whatever in the whole number (57) of operations for movable kidney.

If I add that in nearly every instance the kidneys operated upon were brought out on to the surface of the loin, and in a very large number of them the convex border of the kidney was incised and sutured, it will be understood that these operations from the point of view of risk are essentially the same as neprolithotomy.

When the cases in these three tables are added together, excluding the one referred to above, we get the following result:—

Table I.—34 operations, 33 recoveries, 1 death.
„ *IV.—41 operations, 40 recoveries, 1 death.
„ V.—57 operations, 57 recoveries.
Total—132 operations, 130 recoveries, 1 death.

Thus out of a total of 132 operations, the essential characters of which are much the same, there were 130 recoveries and 2 deaths.

At the Middlesex Hospital, where renal operations are freely undertaken by the members of the surgical staff, a good many persons nevertheless die from the effects of renal calculus who are too ill to be operated upon when admitted. During the years 1885 to 1895 inclusive, calculi were found in the kidneys in 45 out of 3,331 *post-mortem* examinations, and hydronephrosis due to calculus impacted in the ureter was found in four others. That is in one and a half per cent. of persons dying of all conceivable causes, calculi were found in one or both kidneys or ureters.

Many of these 45 bodies found their way to the *post-mortem* room entirely because of calculous disease; and in the rest renal calculi contributed more or less to the fatal result. Amongst the 45 cases there were 10 instances of suppuration in one or both kidneys; 11 cases of perinephric abscess; four cases in which calculi were present in both kidneys; and four others in which only one kidney could be said to exist, the other having undergone complete atrophy due to obliterated ureters in three of them, and cystic degeneration from obstruction in the fourth.

* In Table IV., No. 25 is excluded from this computation for obvious reasons (*see* Table).

Besides these 45 cases, there were 63 instances of suppurative nephritis, in most of which both kidneys were affected; and in many of them renal calculus had played a conspicuous part.

FISTULÆ.

In considering the harmful effects of renal calculi, whether unsuspected, quiescent, and migratory or not, it is impossible to leave out of account renal and ureteral fistulæ.

A fistula may, it is true, occur as a sequel to an operation on the kidney; but it is a more serious matter when it is a result of perinephric suppuration where no operation has been done. It is after *nephrotomy* for calculous pyonephrosis, especially, that a fistula due to operation is most likely to occur.

It is exceptional for a permanent or long-standing fistula to result from nephrolithotomy, or any operation for movable kidney, or a simple exploration. This is rather surprising if we consider the nature of the tissue surrounding the kidney, its proximity to the colon, the fact that there is often an escape of a little urine when the kidney is incised, and that the action of the lower ribs and abdominal muscles in the immediate neighbourhood of the wound is almost incessant, and sometimes violent, as in coughing, retching, and straining at stool.

Fistula is also exceptionally rare after nephrectomy, except when perinephritis or perinephric abscess has previously existed. In cases of nephrectomy for calculous disease, perinephritis has usually preceded the operation, but in spite of this, a fistula followed in only one out of twelve of my surviving nephrectomies for stone—*i.e.* at the rate of a little more than 8 per cent.—and in that case the fistula was superficial, and probably healed shortly after the patient left the hospital, though I have no certain knowledge that it did so.

Out of my 33 nephrolithotomies which survived, a superficial sinus occurred in two (Table I., Nos. 1 and 9), and an urinary sinus in two (Table I., Nos. 6 and 22). In the two latter very large incisions involving the pelvis of the kidney had to be made for the extraction of stones of great size.

After nephrotomy for advanced calculous conditions, *e.g.* calculous pyonephrosis, fistulæ either temporary or permanent, occurred in 37·5 per cent. of the cases operated upon. Though in many of these the fistulæ subsequently healed, still the fact that even a temporary fistula followed in so large a proportion of cases affords a further argument in favour of early operation for stone in the kidney.

But the fistulæ which occur independently of any operation, which are due in other words to long-retained renal calculi, should appeal even more strongly to surgeons as an argument against delaying operative treatment for stone.

The persistency of these fistulæ, the recurrence of deep suppuration if the external orifice of the fistula is allowed to close, together with the abiding troubles caused by the continued presence of the stone in the kidney or ureter, will sooner or later induce the patient to demand surgical assistance.

Then the patient has to undergo risks and the surgeon to face difficulties which only occur when the perinephric structures are matted and hardened by long-standing inflammation or suppuration; and have become so densely adherent to the kidney capsule that it is often no easy matter to find the kidney.

In a stout person with a deep loin it may be quite impossible to distinguish the kidney at all by touch; whilst the resisting nature of the tissues, and the depth of the wound, make it impossible, except through a very extensive incision, and perhaps only after the excision of the last rib, to bring the kidney within sight.

Another and very important fact is that these condensed contracted tissues fill the hilum and surround the whole of the kidney with a fibro-lipomatous mass, which shortens and stiffens the pedicle, and compresses and destroys the elasticity of the renal vessels and of the ureter. The result of this is that the kidney gets tucked close up against the spinal column, and as firmly set in its surroundings as if it were imbedded in plaster of Paris. If nephrotomy is done under these conditions, the renal artery cannot be controlled when the renal parenchyma is incised and the kidney cavity

explored; and thus bleeding is apt to be very free. If nephrectomy is performed the risks and difficulties in dealing with the pedicle are enormously increased.

When a fistula is in course of formation the perinephric abscess should be opened as soon as possible, lest the matter should burrow and discharge in some dangerous direction. It is true the abscess will often make for the loin, or groin, and open spontaneously on the surface, if it be not incised; but it should not be suffered to do so.

If on opening a perinephric abscess a calculus presents, or is readily detected on the introduction of the finger into the cavity, it should, of course, be removed. Several cases of this sort are on record.

It is, however, as a rule, unsafe to search for and explore the kidney when the tissues surrounding it are in an acutely suppurating condition. The safer course is to defer the exploration of the kidney till after the abscess is healed. This necessitates a lengthy convalescence, followed by a fistula, and a second operation, before the cause of the abscess can be removed. After this second operation, whether it be nephrotomy or nephrectomy, it is not unfrequent for the healing of the wound to be delayed by profuse and prolonged suppuration.

The same drawbacks attend operations for calculous affections of long standing if perinephritis without abscess or fistula has existed. There may be the same matting of the tissues, the same fixation of the kidney, the same inelasticity of the pedicle, the same ingrowth of fibro-lipomatous tissue at the hilum, and the same incompressibility of the renal vessels.

If perinephritis has commenced before nephrotomy is performed neither the extraction of a calculus nor the evacuation of pus from the renal cavity may prevent the spreading of the inflammatory process in the surrounding cellular tissue, and the formation of a fistula at a long distance from the kidney.

A good illustration of this is afforded by a male patient (Table II., No. 37), from whom, in February, 1897, I excised the last rib in order to remove from his kidney several fragments of calculus which were assisting to keep up a very bad fistula. Subsequently I had to excise also portions of the ninth, tenth,

and eleventh ribs to enable this long fistulous track to close. The history of the case is briefly this: an abscess formed and was opened between the eighth and ninth ribs, three weeks after nephrotomy by another surgeon at Christmas, 1895. At this first operation some large pieces of calculus were extracted from the kidney. A fistula with a double opening ultimately followed; one aperture being where the abscess had been opened, in the eighth intercostal space behind; and the other aperture in the iliocostal space in the scar of the operation wound. This fistula persisted without interruption, and was attended by great debility and attacks of high fever up to the time of the operation in February, 1897.

In a case reported by Mr. Wright a fistula in the groin followed nephrotomy for obstruction of the kidney by a calculus in the ureter. An abscess formed in the groin and was opened, and three weeks later a calculus escaped through this opening, but an urinary fistula persisted.

Dr. Stephen H. Weekes and Dr. James McFaddon Gaston have published cases of fistula with discharge of calculi in the groin.

In a collection which I have made of unselected cases of fistula due to renal calculi, some of the fistulæ followed the bursting of pyonephrotic kidneys; and others were the result of perinephritic suppuration and the bursting of the extra-renal abscess. Some opened spontaneously into the lung; others into the stomach, or duodenum, or colon; one into the colon and lung, and as both of these organs communicated with the renal pelvis it thus happened that the lung communicated with the colon.* Of those which opened on the external surface one did so below the trochanter, one between the eighth and ninth ribs, one or two in the groin, but the majority in the loin.

When a perinephric abscess burrows beneath the ribs and points posteriorly in an intercostal space, the course taken by the pus is through the costo-diaphragmatic hiatus. This hiatus, formed by the absence of the muscular fibres of the diaphragm, exists on both sides of the trunk, and gives facility for the ascent of pus between the liver and peritoneum, or spleen and peritoneum in front, and the ribs

* Specimen in St. Bartholomew's Hospital.

and intercostal muscles behind. Judging from the cases I have seen, the lung is pushed upwards and the pleura upwards and forwards. Thus the resulting fistula can be dealt with without opening either pleural or peritoneal cavity.

A fistula of calculous origin may be either in communication with the kidney or ureter; or may be limited to the perinephric tissue. In one case (described and illustrated in my book on the Surgery of the Kidney, p. 227) the fistulous track went straight through from the surface to the kidney, without communicating with an abscess in the perinephric tissue.

After an operation in which the kidney has been incised, a fistula may end in a smooth-lined space, containing more or less pus, and surrounding one or other pole of the kidney; but without any communication whatever with the kidney or ureter. A fistula may have a communication with the renal cavity or ureter without there being any escape of urine through it; this can in some cases be demonstrated by the injection into the fistula of an aqueous solution of fuchsin. If the communication is free and direct, evidence of the coloured solution having reached the bladder will be obtainable in a few minutes, as in Nos. 1 and 2, Table VIII.; if the communication is small and indirect, an hour or two may be required before proof is obtained.

The closure of the fistula by surgical treatment is tedious, and sometimes impossible; and in some cases, after having been successfully treated, and remaining closed for many months, or a year or two, it will reopen.

Fistulæ which do not communicate with the kidney or ureter should be treated on the ordinary principles applicable to all fistulæ; those which do so communicate must be dealt with differently in different cases. If there is a calculus in the kidney it must be removed; if the kidney is quite disorganised, nephrectomy is requisite; if the kidney is not disorganised, the fistulous track should be cut out, and the cut surfaces united by sutures. This I did in the case of No. 14, Table VII., with success. When no stone is found in the kidney, the ureter will probably be the seat of some kind of obstruction. There may be an impacted calculus; a stricture, following inflammation or ulceration, caused

by a calculus which has escaped, or a stricture as the result of contraction after peri-ureteritis; or the duct may be distended in one part and contracted in another by suppurative ureteritis. In most cases a renal or ureteral fistula, of calculous origin, will, I believe, close permanently after nephrectomy, even if a stone be left impacted in the ureter, or the ureter be in a state of suppuration at the time of the operation. But should it not do so, it may be necessary, as in the case of fistula kept up by tuberculous ureteritis, to perform partial, or complete ureterectomy.

An urinary fistula, due to obstruction in the ureter, may in time cease to discharge urine, owing to complete atrophy of the kidney. The length of time required for this to be accomplished depends on the degree of obstruction which the fistula on the one hand, and the ureteral block on the other hand, offer to the escape of urine. The more complete the obstruction, the more rapid the atrophy, and *vice versâ*. In a case of my own the process took seven years (*see* "Injuries to the Ureter," page 153 of this work). Even after a fistula ceases to be urinous, it may persist as a suppurating sinus.

Two objections to early operations for renal calculus are: (1) that calculi will be missed if sought for very early, because of their small size; (2) that very small calculi, if they once enter the ureter, pass through the urinary passages without risk to life. Both these objections are unsound, and lead to dangerous delay.

I am not unmindful that there are cases on record, and many others which have not been recorded, in which exploratory operations have been done and no stone detected, though a calculus was present either in the kidney or ureter of the side explored. This will happen to operators who think that, if a stone is present, all that has to be done is to cut down upon the kidney and extract the calculus which at once is revealed to the surgeon. This teaching I have heard from the lips of a very noted surgeon, but nothing can be more misleading or more opposed to the conditions which exist in a large number of cases. Failure to find a stone will also occur with operators who trust to needling the kidney.

It sometimes happens that though one stone is found and extracted, a second and larger one escapes detection if the kidney is not thoroughly explored throughout. It is certainly unsafe to conclude because one calculus is found that there is not another to be discovered. Thus after one of my early nephrotomies for calculus, symptoms persisted which led me a few weeks later to explore the same kidney a second time, when I removed a calculus weighing 360 grains, which I had overlooked at the first operation. This arose from my being satisfied with the removal of a calculus weighing 26 grains and neglecting to thoroughly explore the rest of the kidney. (Table II., Nos. 3 and 4.)

It sometimes occurs that the most careful examination of the kidney shows the absence of calculus in it, yet a stone is present in the ureter; or a stone is found in the kidney and a second is in the ureter. The ureteral calculus will be overlooked unless the ureter is explored by a catheter or bougie. I have had three instances in my own practice in which a calculus has been passed within a few months after a negative exploration of the kidney. I have no doubt that in each of these cases the calculus was either shaken out of the renal pelvis by the manipulation of the kidney for the purpose of bringing it to the surface of the body, or was impacted in the ureter prior to the operation, and that I failed to detect it because I did not explore the whole length of the ureter. In a comparatively recent case in which I did catheterise the ureter after incising and exploring thoroughly the kidney, a small ovoid stone was passed by the patient some five months after. In this case I was conscious, when traversing the ureter, of an obstruction at the brim of the pelvis; but as I could get no sense of grating upon anything like a stone, I inferred that the obstacle was a slight kinking of the ureter, and so neglected to expose and palpate the ureter as I ought to have done. (Table V., No. 50.) If the ureter is properly tested from end to end such disappointments to surgeon and patient will be almost certainly avoided.

In the lists of my operations for calculus, it will be found that stones of all sizes, from two grains to ten ounces, have been removed by nephrolithotomy or nephrotomy; and I do not think one, however small, ought to be missed because

of its small size, with the present method of exploring the kidney and ureter.

The second objection is even more invalid than the first; for there is ample proof that a very minute calculus may provoke the complete destruction of the kidney, or become the immediate cause of death from suppression of urine.

The accompanying figure (Fig. 20) of a pyonephrotic kidney shows the closure of the ureter at its renal end by the



Fig. 20.—A pyonephrotic kidney due to calculi of minute size blocking the upper end of the ureter. (Author's case, Table III., No. 14.)

impaction of two tiny stones, and the entire destruction of the kidney in consequence. (*Vide* No. 14, Table III.)

In some of my cases the most continuous and profuse hæmaturia has been caused by small stones. But—worse than hæmaturia or the destruction of a kidney—calculi weighing less than two grains have caused death.

Sir William Roberts, in his admirable chapter on "Obstructive Suppression of Urine," records a case where three little

oxalate of lime calculi, about the size of hemp seeds, and weighing altogether *one grain and a half*, were found in the lower part of the ureter. One of these was tightly impacted in the terminal part of the ureter, where it passed through the coats of the bladder; this was the cause of the obstruction which resulted in the death of the patient from anuria.

In another case, he tells how the secretion of urine was suddenly and permanently arrested by an uric acid calculus about the size and shape of a hemp seed, which weighed only *one grain and a third*, and which, becoming impacted in the ureter, just above its entrance into the bladder, destroyed the patient in less than ten days.

In a third case a similar course of events was brought about by a round uric acid stone the size of a small pea, which weighed only *one grain and a half*.

In all these cases the opposite kidney had been previously destroyed or obstructed, and the little calculi caused death from anuria by obstructing the ureter of the hypertrophied and only kidney, which was acting.

CALCULOUS ANURIA.

Calculous anuria is the gravest and most fatal of the many serious complications of renal lithiasis. Special attention was given to it in 1872 by Sir William Roberts in the second edition of his classical work on "Urinary and Renal Diseases" (p. 23, *et seq.*); and in 1881 an exhaustive thesis on anuria by Pierre Merklen was published in Paris; but neither in this nor in Roberts' book is the subject of the surgical treatment of calculous anuria considered.

In his 1885 edition, Sir William Roberts, it is true, says in a footnote: "Lately it has been recommended to open the ureter or pelvis of the kidney above the obstruction, and so establish a permanent urinary fistula," but though antispasmodics and a variety of mechanical means are recommended, and diuretics are rightly condemned, still surgical aid was not seriously discussed by either Roberts or Merklen.

Even at the present time the principle of the operative treatment of calculous suppression of urine is either imperfectly known or improperly appreciated by the profession

in this country; because operations are certainly neither sufficiently early nor sufficiently often performed.

In the first lecture I pointed out that Gigon of Angoulême, in 1856, first suggested ureterotomy and the establishment of a lumbar fistula in a case of this sort.

Guermonprez in 1870 (*see* t. xi., No. 1) reported the first case operated upon. The next operation was performed by Bardenheuer in 1882. The patient was a female, aged thirty-seven, with anuria of forty-eight hours' standing. The lumbar method was adopted, and a calculus was found in the upper orifice of the ureter. The stone was pushed back into the renal pelvis and removed through an incision in its wall.*

In 1883 Bennett May and Clement Lucas (*Brit. Med. Journ.*, vol. ii., 1883) advocated nephrotomy and the establishment of a permanent fistula in cases of anuria when one kidney is absent or disabled, and the ureter of the other kidney becomes blocked by a calculus. This is Gigon's suggestion over again.

In 1884, in an article on "Calculus impacted in the Ureter, and the feasibility of removing it by surgical operation,"† I related a case in which for the first time an attempt was made to remove a stone from the lower end of the ureter for the cure of calculous anuria. The calculus was detected in the intra-vesical extremity of the ureter, and I endeavoured to remove it through the bladder after dilating the female urethra. But the attempt was ineffectual for want of a suitable cutting instrument.

Although Emmet had shown in 1879 that a calculus could be successfully removed through the roof of the vagina without opening the peritoneum, and had also removed a stone from the ureter after opening the bladder, it had not then been ascertained that the pelvic portion of the ureter, *i.e.* the part between the brim of the true pelvis and the bladder, could be safely reached and incised by any other route, without running the risk of causing intra-peritoneal urinary extravasation.

In 1884 it seemed improbable that a calculus could be removed from the intra-pelvic portion of the ureter without

* *Centrablatt für Chirurgie*, Marcb, 1882.

† *American Journal of Med. Sciences*, p. 458.

opening the peritoneal cavity, but I recommended, in the article referred to, that the intra-vesical end of the ureter, in both sexes, and as much of the duct as could be reached when exploring the kidney through the loin (and that is practically the whole of the abdominal portion of the ureter), should be directly attacked in cases of calculus impacted in the ureter.

It has, however, since been shown that a calculus can be successfully removed from the intra-pelvic portion of the ureter without opening the peritoneum, and therefore without exposing the patient to the risk of urine escaping into the peritoneal cavity.

In 1885 Israel, as well as Bardenheuer, in Germany, successfully treated anuria by extracting calculi from the infundibulum or the adjacent part of the ureter by means of the lumbar incision. In France Mollière of Lyons, in 1885, was the first who operated for calculous anuria. He punctured the infundibulum through the renal parenchyma with the thermo-cautery on the fifth day of anuria, but though the anuria ceased the patient died on the third day after the operation.

Since 1885 two or three excellent theses on this subject have appeared in France by Legueu, Donnadieu, Glantenay, and Vailhen; and in England, though nothing bearing generally on the surgical treatment of calculous anuria has been published, some brilliantly successful operations by the lumbar route have been reported, notably by Clement Lucas, Ralfe and Godlee, and Kirkham, who were amongst the first English surgeons to operate in these cases. Ceci, in 1887, in a case of anuria, removed several stones from the ureter through the rectum. (Table XI., No. 10.)

Etiology.—Calculous anuria occurs when the ureter or renal pelvis of one kidney is occluded by a calculus; the other kidney being absent, or atrophied, or diseased.

It often affects persons in robust health, and may be sudden and complete in its onset. It is then due to the cessation of function of a kidney which has undergone compensatory hypertrophy, and which up to the moment of obstruction had been secreting the whole or the chief part of the urine.

Calculous anuria is, in the first place, a failure of excretion due to obstruction, but rapidly becomes a failure of secretion owing (1) to intra-renal pressure on the obstructed side, and (2) to reno- or utero-renal reflex suppression in the opposite kidney if the latter has taken any share in the secretion up to the time of the commencement of the anuria.

It must be distinguished from the dysuria, or oliguria, which frequently (though not invariably) accompanies renal colic, and passes off with the attack of pain. This dysuria is attributable to the reflex influence upon the vaso-constrictor nerves of the kidneys excited by the irritation of the mucous membrane of the renal pelvis, or by the stretching of the ureteral walls, and not to any mechanical obstruction to the flow of urine.

In the most typical pathological condition of calculous anuria there is occlusion of both ureters by calculi. (*See* Figures 21, 22, and 23.) The statements herein made are based on two sets of cases collected—namely, 48 cases not operated upon, and 49 operated upon. The last Table, XI., consists of the collected cases operated upon. In 56 cases the situation of the calculi were noted to be as follows:—

1. In the renal pelvis and blocking the upper orifice of the ureter, seven cases. In four of these, both ureters were blocked at the renal orifices.

2. In the upper end of the ureter 30 cases. Both ureters were blocked in five of these cases. In three there was another stone impacted lower down (two in the midpart and one near the bladder).

3. In the middle portion of the ureter, in seven cases. In one case both ureters were blocked, and in two others there was a second blockage by calculus higher up.

4. In the lower end of the ureter, in 10 cases. In one of these there was an impacted stone also higher up, in three of them both ureters were obstructed.

5. In two cases complete suppression was caused by obstruction of both kidneys by a large vesical calculus. (*See* specimen in Middlesex Hospital Museum and Amoden's case recorded in the *Bull. de Société Anatomique*, 1875.)

There are two classes of calculous anurics—the gouty, fat, and apparently robust adult past middle age; and the thin, nervous and dyspeptic person.

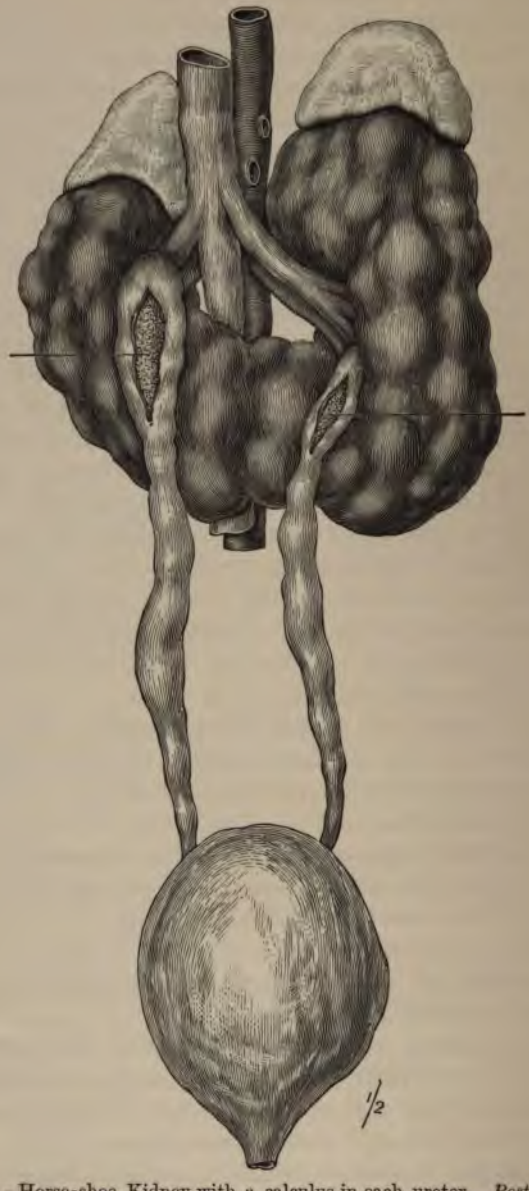


Fig. 21.—Horse-shoe Kidney with a calculus in each ureter. *Post-mortem* specimen. (*Middlesex Hospital Museum.*)

Anuria may occur at any age and in either sex; it is more frequent in males of thirty-five years and upwards, and more especially in elderly men. Instances of children, and even infants at the breast, dying of convulsions from calculous suppression have been recorded (Rayer). Out of 81 cases collected,

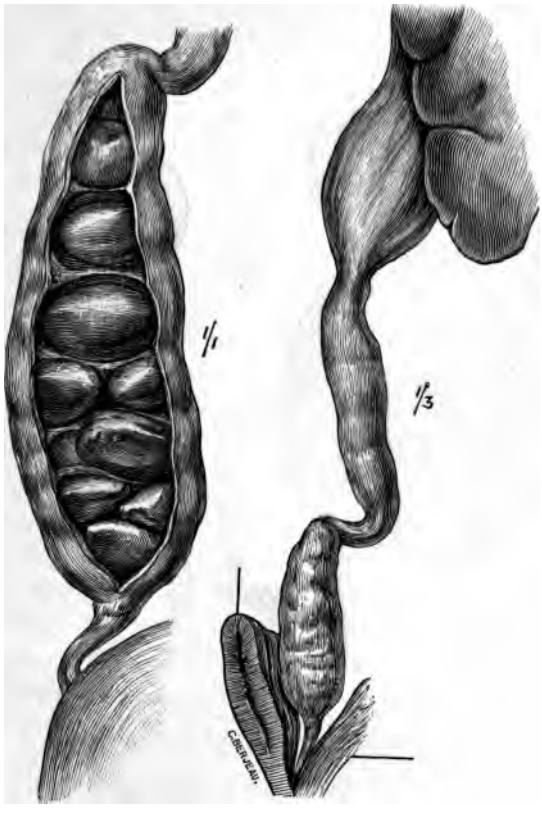


Fig. 22.—Ureters packed with calculi. The calculi in the ureter laid open are represented in the drawing arranged precisely as they were found after death. (*Middlesex Hospital Museum.*)

in which the sex and age are stated, there were 54 males and 27 females. Forty-three out of the 81 occurred in persons between 40 and 60; 15 over 60 years; 19 between 20 and 40; one before 10 years of age, and three between 10 and 20. The youngest was aged six, and the oldest 80.

Much importance ought to be attached to the antecedent

history of patients who become the subjects of suppression of urine from ureteral obstruction. Commonly they have had several previous attacks of renal colic, or of lumbar pains, followed by the discharge of gravel or small stones, months, or even years, before the attack in which the anuria begins. But cases have occurred of sudden suppression of urine from obstruction by a calculus without a previous

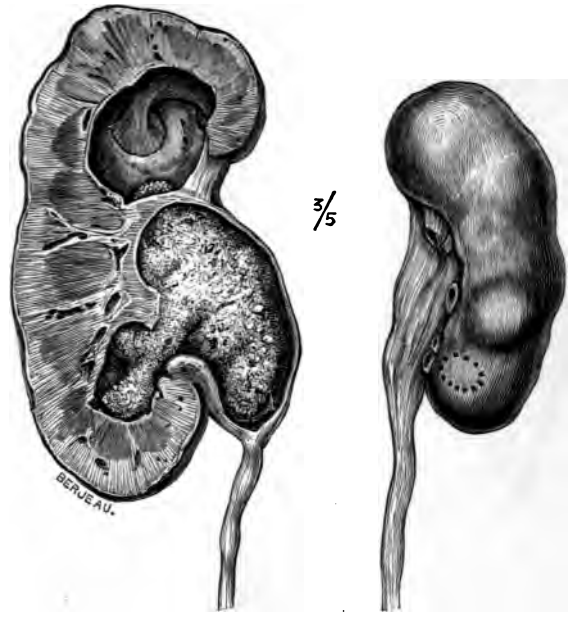


Fig. 23.—The two kidneys of the same person, each blocked with a calculus. The one first affected is atrophied, the other has been hypertrophied, and is becoming granulated. (*Middlesex Hospital Museum.*)

attack of any kind. In such cases both kidneys have been simultaneously obstructed, or one kidney has been destroyed by disease of another kind, or has been congenitally absent or abnormal.

Calculous anuria is often determined, or immediately induced, by fatigue; a drive, or some other shaking movement, such as jumping from an omnibus, violent coughing, running rapidly, are some of the causes, in my own cases, which started the descent of the calculi from the kidney into the ureter.

Symptoms.—The symptoms of calculous anuria are not simply those of uræmia. They also differ in their mode of onset, and in their character, from some other forms of obstructive anuria, such as anuria from cancer of the uterus; from the pressure of abdominal tumours; and from torsion, curves, or stricture of the ureter; as well as from toxic, reflex, and hysterical and other non-obstructive forms of anuria.

When the uræmic symptoms set in they exhibit marked differences from the uræmia of lardaceous disease, of Bright's disease, and of other forms of nephritis.

Though in rare instances the onset is insidious, pain is almost invariably experienced in the region of the kidney involved last, at the outset of the suppression. The pain so started may continue throughout the anuria, but more commonly it is temporary, lasting only a day or two, or less, and then subsiding. Less frequently the first symptom is a dull and continuous aching in the lumbar region, with or without pains radiating along the course of the ureter. In very exceptional cases the anuria has come on without pain on either side, and without the history of previous attacks of renal colic; or the patient has quite forgotten on which side the previous attacks of colic were. These, fortunately rare, are the cases in which the surgeon may have no guide as to which kidney to operate upon.

With the pain there may be troubles of micturition, such as continual desire to pass water, though not a drop of urine may be in the bladder; or the urine is passed with difficulty, and sometimes only in drops or teaspoonfuls. Or, on the contrary, there may be polyuria, the urine being pale and of low density, and showing evidence of imperfect renal function. In other cases the anuria is intermittent, ceasing, after some hours or a few days, to reappear, and become definitely established.

Calculous anuria may be complete or incomplete. In the complete suppression the bladder is quite empty, or, if not, contains but a few teaspoonfuls of bloody urine. In the incomplete form, the anuria is intermittent, but progressive, and interrupted by discharges of urine, insufficient to satisfy the requirements of the system, but sufficient to retard the fatal termination of the disease. When the working kidney

is hydronephrotic the uræmic condition may be deferred for a longer time than otherwise, even if there are no polyuric intermissions.

Calculous anuria, once established, may last many days without causing any symptoms of uræmia. This is perhaps its most striking feature, which it shares with other forms of obstructive anuria, as distinct from the non-obstructive forms. Even when the suppression is complete, seven, eight, or ten days may elapse before the symptoms of uræmia appear, and sometimes death occurs without any of the characteristic symptoms of uræmic poisoning arising at all. When the uræmic phenomena supervene after a longer or shorter time, death follows rapidly, or, at any rate, within a day or two. Thus it happens that authors have come to distinguish two stages in the progress of calculous anuria; namely, (1) the silent or tolerant period; and (2) the uræmic period. But it is important to remember that death may occur as just mentioned without the supervention of the second or uræmic period occurring.

(1) *Symptoms of the tolerant stage.*—In the period of tolerance, the patient, though he may not pass a single drop of urine for several days, may yet walk about, eat, and do mental work in all the appearance of good health. This fact must never be forgotten, if a serious mistake in diagnosis and prognosis is to be avoided. It is, however, all the more likely to escape notice, because it is so opposed to the course of suppression due to non-obstructive causes.

In the non-obstructive forms of suppression, *e.g.* in chronic, sub-acute, and acute forms of Bright's disease; in suppression from shock or collapse, as after severe internal injury, and in the algide stage of cholera or yellow fever; in all forms of inflammation and fever; and in the suppression of urine after slight operations on the urethra or bladder, death may occur within twelve or twenty-four hours. In these cases there will be symptoms of uræmic poisoning, but death would seem to be too rapid to be explained simply by the non-elimination of urinary excreta. Moreover, if the suppression ceases, the return of the secretion is gradual, and the first quantities of urine secreted are scanty, albuminous, and perhaps bloody.

On the other hand, in the calculous cases, the suppression of urine may last days, and if the anuria should cease temporarily, or permanently, free secretion is resumed; and the urine passed is of low specific gravity, and pale in colour; and even, though it may contain blood, it is defective in the ordinary urinary constituents.

The lumbar or nephritic pain which ushers in obstructive anuria often ceases as soon as the pressure of the pent-up urine in the renal cavity, and the pressure of the blood within the renal vessels, are equalised. It is only in exceptional cases, where previous intermittent, or imperfect obstruction has induced a condition of hydronephrosis in the kidney involved, that anuria is accompanied by persisting pain.

Another striking feature is that anuria caused by calculus is rarely quite complete from the beginning to the end of the illness. At different intervals some drops, ounces, or, it may be, even pints of urine—pale, limpid, of low specific gravity, poor in urea, in urinary salts, and in the urinary colouring matter—are voided.

"The characters of this urine," says Merklen, "are so decisive that they strike the patient as much as the doctor. Its density rarely exceeds 1006–1008; it is only rarely albuminous, but sometimes it contains blood and epithelial casts. Owing to its indifferent excrementitious character these discharges of urine have but slight influence on the final result; the total amount of urea eliminated by a patient throughout an anuric crisis being insignificant."

Of course, in cases of calculous pyelitis, or disorganisation of one or both kidneys, the urine may also contain pus as well as blood, and renal casts and epithelium, and yet be deficient in the normal urinary solids.

In certain cases, as in those recorded by Paget and Weber, polyuria occurs, and retards the appearance of uræmic phenomena as well as the fatal termination, which, however, at length arrives just the same.

In Paget's case polyuria occurred on the thirteenth day, and death was deferred till the twenty-second day. In Weber's case a succession of remissions of polyuria took place, and the fatal result was not reached till the thirtieth day.

In one of Roberts' cases the patient lived fifteen days.

Tenneson (*Gaz. Hebdom.*, 1879) reported a fatal case in which the suppression lasted fifteen days. Dr. Ernst Bischoff reported the case of a man at fifty-eight, who for fourteen years had suffered from gout and lithiasis; he had had repeated temporary suppression for several days together; then twenty-three days of anuria, with two very slight intermissions on the fifth and fourteenth days, attended by œdema, fever, and aphthous stomatitis and very high temperature. The *post-mortem* showed a very small left kidney, but in a state tending towards compensatory hypertrophy, with calculi in both ureters and in the left renal pelvis.

In one of my own cases there were two periods of complete anuria for forty-eight hours or more, with intermissions, during which there was a more or less free secretion for eleven days; then three days when the daily secretion was 10 ounces, 6½ ounces, and 1 ounce respectively; and lastly, four days of complete suppression preceding death on the eighteenth day from the onset of the anuria.

In the stage of tolerance, though the general health is at first but slightly if at all affected, yet after three or four or five days some symptoms arise, referable to the digestive organs, such as eructations, nausea, constipation, flatulence, and a white-furred tongue; or referable to the nervous system, such as mental depression, a sense of lassitude and disturbed sleep, or actual sleeplessness. But these symptoms are not constant, and if they exist, may be so slight as to pass unnoticed, especially if the anuria should terminate spontaneously.

In some cases during this stage the desire to urinate is strong and persistent. There may be a sense of weight and fulness about the bladder, and tingling at the end of the pelvis which lead the patient to believe he is unable to empty a distended bladder, and to seek relief by catheter for supposed retention, when the real condition is suppression.

Symptoms of the tolerant stage when hydronephrosis is associated with anuria.—When the working kidney is hydronephrotic, patients with calculous anuria may escape uræmic accidents for a much longer time than others, without having polyuric remissions.

Thus in a fatal case of a man aged sixty-four recorded by Rayer (*Mal. des Reins*, t. iii. p. 490), with an enormous hydronephrosis, the anuria lasted twenty-five days, with only a slight remission on the tenth day. James Russell published a case of anuria lasting twenty days, which terminated by the discharge of 10 litres of urine in twenty-four hours; but a year later the patient died, and at the *post-mortem* examination there was discovered double hydronephrosis with calculi in the pelvis of each kidney.

Roberts cites a case of calculous anuria of ten days' duration, with an increasing tumour in the left iliac fossa; recovery followed a veritable urinary crisis coincident with the disappearance of the tumour.

But whilst hydronephrosis is exceptional in calculous anuria, and such marked polyuric remissions are uncommon, it is, on the other hand, much more frequent for the secretion of urine to cease definitely, shortly after the establishment of the obstruction.

Hydronephrosis occurs only when anuria is repeated on many occasions, for a brief period only, or in an incomplete manner: that is to say, when the obstruction is intermittent, or imperfect and progressive. Thus in one of my cases complete anuria, accompanied with pain and a tumour in the left renal region, occurred on many occasions, lasting two or three days at a time. The right kidney was packed with calculi, calculi being felt to grate on one another, and the left kidney, which had undergone compensatory hypertrophy, was in an early stage of hydronephrosis, and contained a single round calculus the size of a small cherry, which was freely movable in the renal cavity. The left ureter was unobstructed and normal throughout.

In Wilcox's case there were many crises of nephritic colic with anuria, terminated by diuresis, and death ensued at last from rupture of a hydronephrotic kidney after six days of anuria.

It is in cases of anuric hydronephrosis such as this, and also those of Rayer, Weber, James Russell, and Roberts, in which marked polyuria announced the re-establishment of the secretion of the urine, that operative treatment is most likely to succeed. An early operation in such cases

would lead to the discovery and removal of the cause of the hydronephrosis, as well as of the anuria, and would save the kidney from progressive degeneration, and the patient from fatal suppression of urine.

The fact that the opposite kidney is functionless and destroyed is an additional reason for operating, not a contra-indication for so doing, as it is too often considered to be. It was so regarded in the case of my patient, yet the actual result of the operation was all that could be desired. (Table I., No. 34.)

(2) *Symptoms of the uræmic stage.*—At a variable period the second or uræmic stage sets in. When the anuria is complete this period arrives mostly about the seventh or eighth day. For a time no doubt the poisoned state of the circulation is relieved by the supplementary elimination through the skin, lungs, and digestive mucous membrane. But sooner or later these organs are insufficient for the task, and themselves become vitiated by the unaccustomed functions they are called upon to perform; then the blood becomes surcharged, and in turn the nervous system comes under the influence of the uneliminated poison. But why this effect is so much more tardily produced in calculous anuria than in non-obstructive uræmia is not known.

The symptoms of the uræmic stage may be summarised under three groups (*a*) the circulatory, (*b*) those connected with elimination, and (*c*) those of poisoning.

(*a*) The pulse is slow and full and later becomes irregular. Epistaxis in one case was very abundant; œdema about the malleoli and even a true anasarca—the result of venous stasis, not of albuminuria—have been observed in a few cases by Sir William Roberts, Russell, Ernst Bischoff, Tenneson, and Merklen. The temperature is low, as in all forms of uræmia, viz., from 97 to 97·6.

(*b*) Profuse perspirations may occur, but if so, are suppressed in the last day or two of life. The older writers state that the sweat has the odour of urine; but modern writers following Roberts dispute this. Roberts, indeed, goes further, for he says (4th ed., p. 34) "there is never any ammoniacal or urinous odour from the breath or skin, nor from the body after death." In one of my cases, in which there had been

suppression for nine days, Mr. Steedman wrote me that about twelve hours before death the patient's "extremities became cold and clammy, her face swollen, and the breath strongly ammoniacal. The body began to be offensive a few hours after death."

In the absence of sweats, cases of itching of the skin, pruriginous eruptions, and erysipelatous swelling of the whole body are quoted by Rayer; profuse salivation is noted by Weber; blood-stained expectoration by Foissac and Paget.

But more important than the foregoing symptoms is *vomiting*. This is copious and due to gastric irritability rather than to supplementary elimination. It is a symptom of bad omen, which precedes and accompanies the uræmic nervous phenomena. Obstinate constipation and meteorism are common intestinal symptoms. Meteorism may be particularly troublesome. Sometimes there is a veritable intestinal paralysis. Diarrhœa, so common and marked a symptom in my experience, in some cases of uræmia from lardaceous disease, is very exceptional in calculous anuria.

(*c*) Contraction of the pupils and muscular tremors are the two most marked symptoms of the poisoning stage. There are not the great general disturbances which acute nephritis and Bright's disease cause. The dominant feature of fatal anuria is complete depression of body and mind. The intelligence may be perfect to the last moment, but more often it becomes, after a while, impaired, the patient being in a state of semi-sleep, from which, however, he is easily aroused. Occasionally delirium or hallucinations occur. Incessant restlessness and an overpowering feeling of heaviness and general fatigue are, when they exist, the immediate precursors of death. The limbs, instead of being affected by muscular twitchings and agitations, may be benumbed or as if paralysed. The temperature falls lower with the progress of the disease. The respiration becomes slow and sighing and irregular, and the patient dies from paralysis or powerlessness of his respiratory muscles. Or the patient may die of heart failure, without a convulsion, without coma; occasionally death is caused by coma, or a convulsive crisis;

and sometimes by an attack of suffocation, two or three days after the commencement of the uræmia.

Prognosis.—The usual termination of calculous anuria when left to itself is death about the tenth or eleventh day. If, however, the suppression is interrupted by intermittent polyuria, whether hydronephrosis exists or not, life may be prolonged by many days. *Spontaneous cure sometimes occurs.* Legueu states that out of 56 cases of calculous anuria, which neither followed nor were treated by operations, recovery took place in 16; *i.e.* in 28·5 per cent. In one the secretion recommenced on the third day; in 10 between the fifth and tenth days; and in the rest on the thirteenth, fourteenth, fifteenth, twentieth, and in two instances on even a still later day. Of the 40 deaths 23 occurred between the fifth and fifteenth days, one on the fourth day, and the rest on and after the sixteenth day.

Of the 48 cases in my table of cases not operated upon, 38 died and 10 recovered; of the 49 cases operated upon, 24 died and 25 recovered. Thus there is a percentage of recoveries in cases operated upon of 51 as against 20·8 in cases not operated upon. These figures speak loudly in favour of operation for calculous anuria.

Merklen says that while it is uncertain up to what date we may hope for spontaneous recovery, the chances of recovery diminish with the prolongation of the anuria. According to Sir William Roberts, the fatal termination is at hand when contraction of the pupils and convulsive tremors of the limbs occur. Recovery, he thinks, may be hoped for as long as these phenomena have not been observed.

Spontaneous recovery from an attack of anuria is announced by an abundant polyuria, or by the discharge of gravel, blood clot, or calculi. The re-establishment of the secretion is often immediately preceded by the free action of the bowels, or by the escape, per rectum, of an abundant quantity of intestinal gas.

The polyuria, which commences the spontaneous cure, lasts many days, and consists in the discharge of immense quantities of urine at short intervals. This polyuria is often associated with albuminuria. The urine discharged after the expulsion of a calculus is generally albuminous. The

amount of albumen is slight, but it continues as long as the polyuria.

When a first attack of anuria has been of short duration, and then ends spontaneously, recovery may be complete, as the calculus which caused it may have escaped from the ureter. When the anuria has been recurrent, or of long duration and complete, the recovery, if it occurs, is imperfect; and the individual, possessed as he is of only one active kidney, will have a precarious existence, perpetually threatened by another attack, from which, in great probability, he will not escape with the same good result. There should therefore be no delay in operating in cases of relapsing attacks of anuria, even when these attacks are incomplete and of short duration.

The pathological anatomy of calculous anuria may be summed up in the statement that the ureter, or renal pelvis, of one side has become recently occluded, whilst the kidney of the other side is either congenitally absent or functionally suppressed, or structurally destroyed by calculus, or some other form of renal disease. Rarely does simultaneous obstruction of both ureters by calculi occur, although this has been known to happen. In one published case (Amoden's), a large stone embedded in the trigonal area of the bladder, simultaneously obliterated the vesical orifices of both ducts, and the same condition was found in a case which ended fatally in the Middlesex Hospital.

When the calculi occupy the renal pelvis they may either cause complete obliteration by their bulk, or may act as a ball valve over the upper end of the ureter.

Never, according to Merklen, has calculous occlusion of one ureter given rise to fatal anuria, if the kidney and ureter of the opposite side are normal.

Legueu, from an analysis of thirty cases, in which there were *post-mortem* examinations, found that on the side last obstructed there was obliteration of the ureter in twenty-three instances, and calculi in the pelvis of the kidney in the other seven. On the other side there was congenital absence of the kidney in three cases, atrophy, or other change caused by calculus, in twenty, and obliteration of the ureter in six.

In one case, and in one only, was there nothing more than

a slight epithelial proliferation of the tubules. Still, though this was insignificant in degree, it was, nevertheless, enough to alter the functional capacity of the organ.

Legueu found only two instances of fatal anuria in persons with one kidney sound. These are the cases of Bourgeois (Guyon and Tuffier, *Ann. des Mal. gén-urin.*, 1888) and Nepveu, and in one of these the anuria was traumatic.

In twenty-eight cases of those in my lists, in which the state of the two kidneys is given, the condition of the principal kidney was enlarged in eight, enlarged and congested in four, small in two, pyronephrotic in six, and hydronephrotic in eight. The condition of the opposite kidney was as follows: No trace existing in six cases; marked atrophy in eight, in two of which the ureter had become impervious; almost entirely disorganised by calculus in eleven; destroyed by a hydatid cyst in one; enlarged in two.

But though there is, as a rule, a pronounced and long-standing alteration in one kidney before the other, and functionally active, organ becomes obstructed, still, in a proportion of instances, the long-damaged organ had been doing a certain amount of excretion up to the moment of the onset of the anuria. This impaired function becomes quite suppressed by the inhibitory reflex influence, due to the sudden occlusion of the good kidney.

In short, if we leave on one side the rare instances in which both ureters become simultaneously occluded, we see, as Legueu points out, that three factors are required to produce calculous anuria.

(1) A long-standing change in one of the kidneys, causing a diminution, if not suppression, of its function; or else a congenital anomaly (absence or atrophy).

(2) A recent, or recently aggravated, lesion of the principal kidney. This lesion is mechanical, and caused by calculus.

(3) A reflex inhibitory effect upon the disorganised kidney, leading to complete suppression of its imperfect functional power.

Whilst the surgeon can do nothing for the first of these defects, he can remove the cause of the second, and thereby

correct the third. Or if he cannot, by removing the obstruction, re-establish the flow of urine along the ureter, he can create an artificial opening—an urinary fistula—and thereby relieve the suppressed function of the principal kidney, and very probably the reflex suppression of the other.

Out of twenty-three cases of ureteral impaction, the calculus was found in the upper extremity in thirteen, and in the vesical extremity in six. In four cases the stone was situated at some intermediate point.

If to the thirteen cases of high ureteral impaction are added the seven cases in which the calculi occupied the infundibulum, we find twenty out of thirty cases in which the stone could be removed by an ordinary exploration of the kidney.

The dilatation which takes place behind a sudden obstruction is very moderate, so that the quantity of urine in the ureter and renal cavity is very small. The pelvis of the kidney contains only a little urine, which is frequently blood-stained. The kidney itself is hypertrophied and congested, and thereby enormously increased in volume; but, as a rule, it is not hydronephrotic. Numerous cases prove that impaction of a calculus in the ureter is much more likely to be followed by an immediate arrest of the secretion of urine than by retention of urine, and dilatation of the parts above the seat of obstruction; because the ureter and renal pelvis are not susceptible of sudden dilatation.

Ecchymoses on the surface and in the substance of the kidney, true infarcts, are lesions which have been obtained by experimental ligation of the ureter, and have been found in some cases of obstruction at the time of operating, and in others at the *post-mortem* examination.

When the obstruction has been intermittent, or imperfect and progressive, instead of being sudden and complete, hydronephrosis will be found.

The cases of hydronephrosis are, however, very exceptional, although slight dilatation of the calyces and numerous small cysts in the cortex are common conditions.

The above are the changes which involve the principal kidney, and lead immediately to anuria.

The changes in the other kidney are of more or less ancient date, and have been possible of production owing to the integrity of the opposite kidney. Simple atrophy, without hydronephrosis, is one of the most frequent consequences of old calculous obstruction of the ureter.

The sudden obstruction of one organ, whether by ligature or disease, when the other is intact, culminates in *atrophy* without dilatation. In the same way the sudden obstruction of a single kidney causes almost immediate suppression, and not hydronephrosis.

Hydronephrosis with great thinning of the parenchyma is, however, sometimes found. In these cases the calculus which has been the starting point of the hydronephrosis, may have long ago escaped, leaving behind a condition which results in a strictured, or even an impermeable ureter.

Diagnosis.—The occurrence of former attacks of renal colic in a gouty person, followed by the sudden onset of pain on one side, and this accompanied or immediately followed by anuria, points at once to obstruction of a calculous nature.

The diagnosis will be further strengthened if a swelling, or distinct tenderness on pressure, is present in the renal region, or in the course of the ureter, of the side recently become the seat of pain.

But in some cases there is not a distinct history of previous attacks of renal colic, and yet one kidney may have become silently but entirely obstructed, or destroyed by calculi, as shown in Lecture II.

In other cases there have been previous attacks of renal colic or pain, but the patient has forgotten on which side the pain was felt.

If under these circumstances anuria sets in it may be difficult, or impossible, to diagnose on which side the recent obstruction exists. The surgeon thus in doubt must seek information by the examination of the patient in the following manner :—

(1) The course of the ureter should be palpated, if possible, through the abdominal parietes. This is often an impossibility, owing to the stoutness of the patient. The

ureter in which a calculus is impacted is likely to be inflamed and painful, as well as tender; even when a calculus has passed along the ureter it is likely to be followed by pain, lasting several days after its escape.

(2) Rectal and vaginal examination should be made. In the male, digital examination per rectum has led to the discovery of a calculus impacted in the lower part of the ureter, as in Rawdon's and Ceci's cases; in the female, the same discovery has been made by vaginal examination by Emmet and by myself, and I have also detected the presence of a stone by vesical examination after dilating the female urethra.

(3) Catheterisation of the ureters, though easy of application in the female, does not afford satisfactory assistance in these cases, whether done across the bladder through the dilated ureter, or by vaginal cystotomy as practised by Bozemann and Emmet, or by the aid of supra-pubic cystotomy. The cystoscope in the cases of anuria is quite unnecessary and out of place, as it can give no information which is not more fully ascertained by rectal or vaginal examination and a sound in the bladder. Valuable time will be lost by such explorations of the ureter, and it will be far better at once to resort to exploration of the kidney.

If there be a calculus in the terminal part of the ureter it will almost certainly, if of any size, be detected by either rectal or vaginal examination, and can be extracted by one of the operations to be mentioned later on. But if by these modes of examination nothing is detected in the inferior extremity of the ureter, we ought without delay to explore one or both of the kidneys through the loin, and to select first the side on which recent pain, or tenderness or swelling, or a hard contracted condition of the abdominal walls exists, or has recently existed. Through such an incision the kidney and adjacent part of the ureter can be seen and felt, and the rest of the ureter catheterised; and if a stone be found it will be possible to remove it, and if no stone be found then by establishing a renal fistula relief will be given to the congested state of the kidney, and a condition will thereby be brought about favourable to the resumption of the secretion of urine.

Calculous anuria and uræmia have to be diagnosed from non-obstructive forms of anuria, and from other forms of obstructive disease.

The anuria occurring with cancer of the uterus (the most frequent cause, after calculus, of obstructive anuria); and the anuria caused by rare varieties of tumour of the bladder, or ureters; by uterine myomata; and, in exceptional cases, by the gravid retroflexed uterus, is alike in some respects to calculous anuria; but differs very markedly in others, and especially in the development of hydronephrosis so common in cancer and these other cases, but so uncommon in anuria from calculus.

From polycystic disease.—A case of anuria from double polycystic disease, in which the symptoms and history were those of calculous obstruction, has been under my care this week. The patient, a rather stout but well-made, muscular man, aged fifty, first had pain in his right loin in 1884. Subsequently he frequently passed gravel, and in 1894, after attacks of pain in the right kidney, a small stone. He has been in very indifferent health since then, suffering pain in the right loin. On Wednesday, March 16th, he had another attack of pain like the former ones, but in the left side as well as the right, and passed very little urine after then. Both his kidneys were cut down upon, first the left, then, two days later, the right. Both kidneys were found in the same state. Several cysts were opened in each, and the lessened tension resulting therefrom gave him some relief. He died yesterday, March 24th, on the ninth day of the attack, and after five days of complete suppression. Muscular twitchings, meteorism, sleeplessness, restlessness, a small rapid pulse, pallor of face, blueness, and coldness of extremities, and at last subnormal temperature and dyspnœa were the chief symptoms. The kidneys and liver, which are also cystic, are before you. There was no stone or other gross obstruction present throughout the urinary organs.

From uterine cancer.—Cancer of the uterus after calculus is the most frequent cause of obstructive anuria.

I have seen many cases of anuria from uterine cancer in the cancer wards of the Middlesex Hospital; but I do not remember ever to have seen *uræmia* from this cause

arise before any of the ordinary symptoms of carcinoma of the uterus have declared themselves. Such cases, however, have been recorded and have given rise to difficulty in diagnosis, as the suddenness of the attack has suggested calculous anuria. Avan reported a fatal case of uræmia attended by eclampsia and prolonged coma in a woman who had never complained of any of the symptoms of uterine cancer, and who was suddenly seized with eclampsia in the street and died. Cancer of the uterus was found on *post-mortem* examination to have caused double hydronephrosis by pressure on the ureters.

Complete and prolonged suppression of urine at an early period of the cancer, or in uterine cancer which has been latent up to the onset of the anuria, is also recorded. Merklen quotes cases of total suppression for seventeen and twenty-one days due to uterine carcinoma, which had not previously caused any of the classical symptoms of the disease. Roberts also cites a case of the same kind, in which anuria lasted fifteen days, and presented the clinical symptoms and followed the course of calculous anuria. Such cases are very prone to be mistaken for anuria from impacted calculus.

Primary cancer of the bladder may obstruct the ureters, like uterine cancer when it has invaded the trigone. Roberts records a case in which the symptoms were those of calculous anuria; but at the *post-mortem* examination scirrhous carcinoma at the base of the bladder was found, involving the prostate gland, and both ureters passed for the length of an inch through the growth. Double hydronephrosis—old on one side, recent on the other—was the result.

Suppression has been known to occur suddenly, and to be followed by uræmia, vomiting, and fever, as the result of secondary carcinoma in the renal pelves and ureters. Voluminous tumours of the uterus or its appendages may obliterate the ureters and give rise to suppression.

Many cases after operations for myoma of the uterus succumb to uræmia with dilatation of the ureters and renal pelves.

The diagnosis between calculous anuria and cases of anuria from uterine cancer, and the other causes of ureteral

obstruction, will be assisted by digital examination of the vagina and rectum, and by palpation of the abdomen.

Amyloid degeneration is attended commonly by polyuria, albuminuria and paraglobinuria; œdema is frequent, diarrhœa common, and vomiting and uræmia rare. The course is one of slow progress with remissions. The duration of the symptoms is considerable. When uræmia occurs in amyloid degeneration, as it does in some cases towards the end, the symptoms which I have observed are great restlessness and sleeplessness, delirium approaching the noisy form, contracted pupils, marked muscular twitchings, diarrhœa, diminishing quantity of urine, with loathing of food and loss of control of the sphincters. Just preceding death, the patient becomes quieter and coma supervenes.

From traumatic anuria.—Calculous anuria will be diagnosed from traumatic anuria, in which the vessels of both kidneys are thrombosed, by the symptoms following an injury; and from the anuria following catheterisation and other operations on the lower urinary passages, by the absence of the general malaise at the onset, and of the rigors, high temperature, and intense prostration which accompany urinary fever. After extensive thrombosis of the vessels, arteries, or veins of both kidneys polyuria has been observed, as in the case recorded by Moxon in the 14th volume of the Guy's Reports.

In connection with the diagnosis of calculous anuria, and indeed, with the diagnosis of renal calculus generally, reference ought to be made to the case recorded by Mr. Howard Marsh, already referred to in Lecture II. (p. 52) (*Chir. Soc. Trans.*, vol. xxv., p. 195). Mr. Marsh argues in favour of Raynaud's disease—as explaining the severe paroxysmal renal colic, the hæmaturia, and the frequently repeated attacks of anuria for periods varying from fifteen to fifty hours at a time. He brings forward many points in support of his argument, and has certainly raised a question of deep interest, which merits further investigation.

But whether the case in point is an instance of what might be called Raynaud's disease of the kidney or not, it presents clinical features which mark it off sharply from the class of calculous anuria. (1) The pain was too

paroxysmal in character, and the suppression of urine was more like the dysuria of renal colic—coming on and passing off with the pain; (2) every attack of anuria was attended by pain, and other severe functional and constitutional symptoms, such as fainting, vomiting, great headache, and high temperature; (3) when the attacks of suppression ceased, the urine was of normal specific gravity and often loaded with blood; and was passed with pain and difficulty. These symptoms are quite different from those which characterise calculous anuria.

Treatment.—The treatment of anuria, up to fifteen years ago, was entirely medical. Death was the common result. No wonder; for what else could be expected from purgatives and diuretics, from diaphoretics and antispasmodics, from baths, forced exercise, and massage? Drugs, such as digitalis and pilocarpine, and others, which induce the elimination of a considerable quantity of water from the system, remove only a small quantity of urea with the water, and thus leave the blood proportionately more highly charged with urea. For this reason, such supposed remedies ought to be ordered with extreme precaution in obstructive anuria.

The surgical treatment of calculous anuria is a question of the day, and one of the greatest importance. Formerly, no one dared to do more than suggest operation, though Rayer, and Gigon in 1856, had strongly recommended it. It is only since nephrolithotomy was practised that operations have been performed for anuria, and there are already several cases which show the advantage of well-timed surgical intervention. At the present time the necessity of operating ought to be recognised, nor ought opinions to differ as to the period of intervention, or as to the kind of operation to be done. By an operation the calculus can be removed, or if this is not possible, an artificial outlet can be established in the loin.

Nephrotomy should be performed in the gravest cases to prevent death from uræmia; in the slighter and intermittent cases, to extract a stone which may at any time produce complete persistent anuria.

Nephrotomy for obstructive anuria is only a recent application of a long-recognised principle of practice in other fields of surgery. Why, in the case of an obstacle in the ureter, should we hesitate to relieve the obstructed kidney? Is it not all the more imperative upon us to do so when the obstructed kidney is the only one which is functionally active.

When the obstructing calculus is too low down in the ureter to be removed through a lumbar wound, the parietal incision should be prolonged towards Poupart's ligament, the peritoneum should be detached and turned inwards towards the median line, and the stone cut upon through the ureteral wall, and extracted.

When the calculus is in the lower portion of the ureter, or within or close to the vesical orifice, the advisability of adopting one of the special methods for reaching the ureter in these parts will have to be considered; but in many cases the state of the patient will make it necessary to postpone this for a time at least. Should the obstruction not be removed at the primary operation, a lumbar renal fistula should be established; and ureterotomy may be subsequently successful; or the stone may be naturally expelled, and thus the normal channel will be opened up, and the fistula allowed to close.

Opinions have hitherto differed as to the precise time when the surgeon should interfere. To be successful it is certain that the operation should be done early and before the uræmic stage is reached. But since this stage is generally delayed till after the sixth day, some authors have advocated the fifth or sixth day as the period of surgical operation.

In Demon's case the intervention was made on the eleventh day, and in Chevalier's on the fourteenth with complete success—but on the other hand operations on the third day have been unsuccessful in restoring the secretory function. Moreover eclampsia, necessitating immediate operation, may occur as early as the third or fourth day of the anuria, as in Vailhen's case. Sudden death may occur early in an anuric person who seems to be in fair general health.

My opinion is that an operation ought to be performed as soon as the anuria is established and the diagnosis is

satisfactorily made. So useless is medicinal and expectant treatment, that I have refused to attend consultations in cases of calculous anuria unless I have permission beforehand to operate at once if I think the case suitable.

The operation is serious only on account of the condition for which it is performed—viz. (1) the urinary suppression produced by the obstruction, (2) the poisoned condition of the blood produced by the suppression, and (3) the structural changes in the kidney the consequences of the obstruction.

We should operate on the side *last* affected, when the indication on this point is clear. It is not the kidney which has longest suffered, or which has yielded most calculi, which ought to be incised. The contrary ought to be the rule, because the more the kidney is affected, the more extreme its degeneration, the less the secretion which it will yield, and consequently the less the benefit from nephrotomy.

In the absence of exact history, drawn from the patient himself, it is necessary to try and ascertain by careful examination of the abdomen which kidney to explore. When there is no enlargement of the kidney, and no pain or tenderness, there may yet be a considerable degree of hardening from contraction of the abdominal muscles over the part of the kidney which is last involved.

In most cases it will be best to explore the kidney first, but in certain exceptional instances, as when the stone can be felt per rectum or per vaginam, or evidence clearly points to the side and precise spot at which it is impacted, ureterotomy should be done. For this, nothing less than actually feeling the stone through the abdominal parietes (a most unlikely thing in persons suffering from calculous anuria) ought to satisfy. The localisation of stone, as to whether it be in the kidney or ureter, is very uncertain; most frequently, when impacted in the ureter, the symptoms it causes are referred to the corresponding kidney; but occasionally the reverse obtains, and a stone in the renal pelvis gives rise to fixed abiding pain and acute tenderness at one particular spot in the course of the ureter.

The nature of the operation performed in the 49 collected cases was as follows:—

1. *Operation stated as nephrotomy*, or (in a few cases) merely exploration of kidney, in 34 cases. In one of them the operation was performed by the thermo-cautery.

2. *Incision of the renal pelvis*, five cases. One was done by thermo-cautery.

3. *Incision of the ureter*, seven cases. One was performed through the rectum. In one case, not included in Table IX., an attempt was made to remove an obstruction from the lower end of the ureter by means of the finger in the bladder.

THE TECHNIQUE OF THE OPERATION FOR EXPLORING THE KIDNEY AND URETER.

The method I adopt for exploring the kidney and ureter for stone is the following.

In the first place, if there is the least reason for thinking a stone has descended along the ureter, I make a digital examination of the rectum and sound the bladder under an anæsthetic. With the finger of the left hand in the rectum well pressed against the base of the bladder, I pass the beak of the sound across the vesical orifices of the ureters. In the female a similar examining is made of the vagina and bladder; and, if necessary, the urethra is dilated and the interior of the bladder is digitally examined, and inspected by means of Kelly's tubes and the electric light, and the ureters are catheterised from the bladder. But this inspection is rarely needful or helpful, and as a rule an unnecessary waste of time. The kidney to be first explored should be that on the side of the pain. This should be a rule of practice. Though it is true, as I have shown in the second lecture, that relief of symptoms (pain, fever, nervous disturbance, etc.) may coincidentally follow the extraction of a calculus from the opposite organ, still this is no proof that the kidney or ureter on the side complained of is not the one in which the exciting cause of the symptoms is present.

The incision I have from the first always employed is a very oblique lumbar one, commencing an inch above and in front of the anterior superior iliac spine, and continued outwards and backwards to the outer edge of the erector spinæ muscle, about

a finger's breadth below the last rib (Fig. 24). The length of the incision varies with the figure and degree of stoutness of the individual. More frequently than not it is unnecessary to begin so far forward; and sometimes it is advantageous to continue the skin incision backwards a little over the erector spinæ

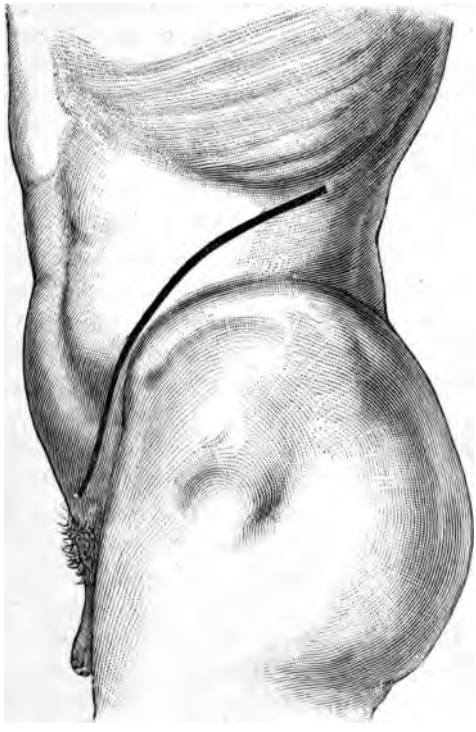


Fig. 24.—Showing line of incision in Case for retroperitoneal exploration or excision of the kidney and ureter.

muscle. The direction of the lumbar incision is, however, always in a line between the points mentioned. When more room is required, a short vertical or slightly curved incision is made upwards from the oblique wound, extending over the back of the twelfth rib. This greatly facilitates deep manipulation, and is a step towards clearing the last rib in the event of the excision of that bone being requisite. Manipulation is also sometimes facilitated by snicking the outer edge of the quadratus

lumborum, and even that of the erector spinæ. The latter very rarely needs to be interfered with, and if divided should be sutured at the end of the operation.

When more room in front is required either for freeing or inspecting the kidney, controlling bleeding in the deep part of the wound, or for tracing the ureter, the incision should be carried in a curvilinear way toward Poupart's ligament, and then forward parallel to and an inch above that ligament, as far as the internal abdominal ring, or further. Bleeding points should be controlled as they occur by torsi pressure forceps, and if the last dorsal or the ilio-hypogastric nerve is in the way, it is best to excise an inch or more of it. After the division of the transversalis fascia, a look out should be kept for the colon, which frequently bulges into the wound and requires to be held aside by a broad retractor. With the forefinger, the back of the kidney should now be felt, covered by its loose fibro-cellular investment. By means of two pairs of long forceps this investment is seized and dragged up into the wound, and divided with scissors between the forceps. Then at once bulges out, through the little opening, the fine canary-yellow fat which immediately invests the kidney. Into this opening in the thin fibro-cellular investment the tip of first one, then of the other, index fingers should be inserted, and it and the included fat should be torn open and carefully detached from the kidney. The renal pelvis and upper end of the ureter should be palpated before the kidney has been much disturbed from its position, in order to search for any small calculus, and, if one be present, to prevent it from dropping into the ureter during the act of drawing the kidney on to the surface of the loin. When freed of its connections anteriorly, posteriorly, and at both its ends, the kidney should be brought bodily on to the surface of the loin. This in a large number of persons can be done without difficulty and without causing tension of the renal pedicle; but in others, with thick-set trunk and very fat parietes, it is not possible to bring the kidney quite out of the body even when great traction is made upon the pedicle. Forcible pulling upon the pedicle, however, must be avoided. When, owing to these conditions, the kidney cannot be brought out of the wound, the wound should

be made amply large enough to allow the surgeon to see clearly the kidney which he is about to incise. Unless this be done, there is always the risk of wounding the branch of the renal artery or vein which runs over the back of the renal pelvis before entering the parenchyma on the posterior surface of the organ. Moreover, small branches of the renal artery anastomising with the lumbar vessels may be wounded, and should be seen to be ligatured. If no calculus is felt, an incision is next made into the kidney along its convex border, whilst the finger and thumb of the left hand steady the kidney and compress the pedicle. This compression of the pedicle serves a double purpose: (1) it limits hæmorrhage, and (2) it prevents a small calculus, which might drop out of one of the calyces, from falling into the ureter. Through the wound in the kidney the right index finger is introduced, and a careful detailed manipulation is made of every part of the interior of the organ. Needling the kidney for diagnostic purposes is most unreliable and should be abandoned.

Whether or not a calculus be found in the kidney, the ureter should always be catheterised from end to end, to test if its lumen is quite free. If this is not done, a small calculus —say, of one and a half, or two grains or more in weight— may be missed.

If the ureteral catheter can be passed readily through the renal cavity by way of the incision in the convex border of the kidney, this should be done; but it is often impossible or troublesome to hit off the orifice of the ureter in this way. If so, the back of the infundibulum should be cleared, and a minute longitudinal incision (to be subsequently closed by a Lembert suture of fine silk), should be made into it with the point of a narrow sharp scalpel, or sharp-pointed scissors, and through this incision the catheter should be conducted. (See Fig. 4, p. 20.) In doing this, care must be used not to mistake the renal vein, or a branch of the vein, for the renal pelvis. Should such an error be made, bleeding will be readily controlled by pinching up the edges of the tiny wound, and applying a circular ligature. When any doubt arises, the vein will be distinguished from the ureter by the return of blood into it after ceasing to compress the tube.

There is often quite a plexus of fine blood-vessels on the surface of the infundibulum and ureteral wall which must be avoided if possible.



Fig. 25.—Base of bladder with stone impacted in ureter immediately above it. (*Westminster Hospital Museum*, No. 834.)



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Fig. 26.—Sacculated kidney caused by calculus impacted in lower end of ureter. From same subject as Fig. 25. (*Westminster Hospital Museum*, No. 820.)

If there be a stone in the ureter, the catheter will be obstructed at the point of impaction. In the male, whether

this point be in the abdominal or the pelvic course of the ureter, the calculus can be reached and removed retroperitoneally, by prolonging the anterior or lower end of the incision in the direction mentioned before.

In the female the same procedure answers for the abdominal and first portion of the pelvic course of the ureter; but for the removal of a calculus from the ureter within the broad ligament, especially near the uterus or vagina, the vaginal or sacral route is the best. If situated quite at the vesical orifice of the ureter, it can be extracted through the bladder after dilating the urethra and, if needful, slightly incising the ureteral orifice. No attempt should be made to extract a calculus through the bladder unless it be situated quite at the internal opening. A calculus, if it is of fair size, may be felt through the bladder, when it is in the ureter just above the point where the duct enters the vesical wall (see Fig. 25). When here, it cannot be so removed without exposing the patient to the danger of an intraperitoneal urinary fistula.

In a case recorded by Thornton of uretero-lithotomy this accident happened, and the patient died.

In the male the sacral method might also be employed for a stone situated just above the bladder; but the retroperitoneal inguinal route through which it is possible to trace the ureter quite up to the point where it enters the vesical wall, is to be preferred.

When the part of the ureter in which the calculus is situated has been reached, the wall of the ureter should be divided by a short longitudinal incision made either upon the calculus or immediately above it. The calculus should then be extruded through this opening. If the stone is impacted below the brim of the pelvis it should, if possible, be made to retrace its steps, by gentle pressure, till it is brought up into the duct above the pelvic brim. If the ureter is dilated above the stone, and the stone can be readily pushed back into the dilated portion, this should be done, whether the point of impaction is above or below the brim of the pelvis. The incision in the dilated tube may then be closed by one or two Lembert sutures passed across the line of the incision. Otherwise the stone must be directly cut upon where it is

impacted, and as the tissues of the ureter are likely to be much contused, perhaps ulcerated, owing to the pressure of the calculus, they may not be in a favourable state for immediate repair, and therefore sutures for the ureteral wound may be of very doubtful utility, or even harmful. Care should be taken to provide drainage for any urine which may escape through the ureteral wound, otherwise serious mischief in the pelvic cellular tissue may occur from the too early closure of the external wound, as happened in a case referred to in Lecture II.

In the greater number of cases, when the calculus is not in the kidney, it is in the ureter, within an inch or two of the infundibulum. In several cases I have pressed a stone upwards out of the ureter, and removed it through an incision in the wall of the renal pelvis.

It is, I think, quite immaterial whether a calculus is removed through the parenchyma or infundibulum of the kidney. I formerly was of opinion that there was less chance of urine escaping, and quicker healing of the wound, when the incision involved the parenchyma only. But since employing sutures, which I began to do several years ago, I do not find that wounds in the renal pelvis or ureter heal any the less readily.

In operating upon the sound kidney, I do not hesitate to cut directly down upon a calculus, wherever it may present; still less need one do so in a kidney the cavity of which is pouched and the parenchyma atrophied. When so made, the incision should preferably radiate from the hilum; but when the parenchyma is very thin, and a large branched calculus or several calculi are present, the incision may be made in any direction which gives the greatest facility for extracting the stones.

In calculous pyonephrosis I have removed seven stones through as many separate incisions in the thin parenchyma.

After the removal of the calculus, the rest of the kidney can be explored through this incision; or, if not, a second incision should be made in the convex border of the organ.

As long ago as 1829 Gerdy* had advised that the convex border of the kidney should be selected for incision in nephrotomy. The advantages, depending on the anatomical arrangement of the blood-vessels within the kidney, of an incision along this border are considerable. Moreover, through no other single incision can a complete examination of the cavity and substance of the kidney be so conveniently made.



Fig. 27.—Kidney with uric-acid calculus impacted in its pelvis. (*Westminster Hospital Museum*, No. 828.)

It is the opinion of Barth† and Tuffier that the extent of parenchymal degeneration about nephrotomy wounds depends chiefly on the size of the vessels divided; and if this be so, it is a further reason for making the incision, as Gerdy advised, along the convex margin.

After removing a calculus from the renal pelvis, if the convex border has not been incised, the interior of the kidney should be palpated either through the opening, or,

* Gerdy, P. N.: "Anatomie des Formes Extérieures du Corps Humain" (Paris, 1829). See note on page 153.

† *Archiv f. klin. Chir.*, Von Langenbeck, 1893, xlvi., 418.

if this be too small to admit the finger, then by invaginating the infundibulum.

I have taken out some very large stones, weighing between 800 and 900 grains, through incisions in the dilated infundibulum, large enough to admit readily the tips of two fingers. In such cases an incision in the convexity of the organ for examination purposes, is quite unnecessary. In some cases, indeed, the calculus is so bound down into the renal cavity



Fig. 28.—The same kidney as shown in Fig. 27, seen from within to show an uric-acid calculus impacted in pelvis and bound down by dense fibrous bands. (*Westminster Hospital Museum*, No. 828.)

by thick fibrous bands between the calyces that its extraction would be most difficult through an incision in the renal substance, whereas it is readily pulled out through the infundibulum. (See Figs. 27 and 28.)

I have repeatedly extracted calculi through the anterior as well as through the posterior wall of the renal pelvis without a drop of urine subsequently escaping through the loin wound. This result may be safely expected provided the renal opening has been closed by Lembert sutures passed transversely.

If sutures are not used it is better, if convenient, to open

the anterior rather than the posterior surface, for it stands to reason that the urine as it courses along upon the posterior wall of the duct, when the patient is recumbent, is less likely to escape through an incision in the anterior—*i.e.* the upper —wall of the passage.

In advanced pyonephrosis I have not always used sutures after nephrotomy, and it has often been a matter of surprise how readily some of these cases recover without having even a temporary urinary fistula. Suppuration in the renal cavity is by no means always a sufficient reason for not using sutures and for not making an attempt to obtain immediate union.

Fenger, whose opinion in renal surgery commands attention, does not believe that a kidney with a stone in its pelvis is, in any case, really aseptic, and he warns against the employment of sutures, or making an attempt to secure primary union. He relates a case in support of this contention; but neither the case nor the arguments are convincing.

When the renal cavity is sacculated and suppurating, it should be freely irrigated with a hot, weak solution of Condy's fluid, of perchloride mercury, or of carbolic acid. In a few instances the calyces have been found packed with a putty-like mass of muco-pus, which was thoroughly cleared out with the finger and little swabs of cotton-wool.

In every case a drainage-tube is inserted into the wound around the kidney, but not into the kidney cavity itself. I prefer a tube to iodoform gauze, for the latter, by sucking up and retaining the serum and blood, keeps the surfaces of the wound apart, and prevents immediate healing.

In closing the parietal wound I transfix the whole of the layers, skin, muscles, and fasciæ, with the same sutures carried by means of Hagedorn's large curved needles. I have for some considerable time abandoned the use of buried sutures for the separate layers of muscles and fasciæ.

The length of time required for convalescence of course varies. In cases of simple nephrolithotomy patients are often able to sit up on the eleventh or twelfth day, with their wounds healed; and many have returned to their houses between the

second and third weeks after the operation. Nephrectomy is frequently as rapidly followed by complete recovery. When the kidney and the perinephric tissues are much disorganised, healing is apt to take place for the most part by granulations, and thus after nephrotomy four or five weeks are often required.

LECTURE IV.

INJURIES OF THE URETER.*

INJURIES to the ureter are exceptionally rare, if we exclude those which occasionally happen in the course of certain surgical operations on the abdominal or pelvic viscera. Its small size, its deep position, the fact that in one-half of its extent it is protected by the bony wall of the pelvis, its loose connections whereby it is able to move freely upon the structures behind it, together with its own elasticity, serve to explain this exemption from injury.

In 1885, when writing on "Rupture of the Ureter," I stated† there was no occasion to consider it apart from rupture of the kidney, because in the very few cases on record the rupture of the ureter was quite close to the renal pelvis, and that it was neither practicable nor requisite, from the point of view of treatment, to distinguish between subcutaneous rupture of the renal pelvis and subcutaneous rupture of the ureter.

With reference to "Penetrating Wounds of the Ureter," I therein pointed out that, with the exception of the gunshot wound of the ureter which happened to the Archbishop of Paris in 1848,‡ and the doubtful case recorded by Hennen in 1818,§ there did not exist any published report of a penetrating wound of the ureter alone, unless we accept Holmes' very doubtful case as such.‖ M. Leon Le Fort has since published a case of penetrating wound, completely dividing the ureter by a knife (*Bull. de l'Académie de Médecine*, November 9th, 1880, p. 1185).

No case of penetrating wound is reported to have occurred in the American War of the Rebellion; and when we recall

* Revised, with additions, and reprinted from the *Edinburgh Medical Journal*, January, 1898.

† "Surgical Diseases of the Kidney."

‡ *Gaz. d. hôp.*, Paris, 1848.

§ "Military Surgery," 3rd edition, p. 430, Case 72.

‖ *Med.-Chir. Trans.*, London, vols. lx. and lxv.

the care and thoroughness with which the medical and surgical history of that war was prepared, this fact alone shows the extreme rarity of such injury.

The conclusion arrived at was that the diagnosis, symptoms, sequelæ, and treatment of injured ureter in no way differed from those of ruptured or wounded kidney.

These remarks were based upon a careful perusal of the reports of thirteen cases described as subcutaneous injuries, and upon the three cases above mentioned of penetrating wounds. The cases were all that I was at that time able to discover, after a fairly laborious search through the literature of wounds and other injuries of the abdominal viscera.

Two of the cases of subcutaneous injuries had been under my own personal observation. As dresser to Mr. Hilton, I was responsible for the notes of his case, which was one of rupture of the kidney, not, as Poland described it, and others have quoted it as being, one of rupture of the ureter; and, as house surgeon at Guy's Hospital at the time, I daily watched Mr. Poland's case, which was really one of ruptured ureter.

Although reports of renal cases of a surgical nature have during the last ten years multiplied a thousandfold, and although experimental researches and tried or suggested operations upon the ureter have led to the surgical affections of the ureter being considered as a subject distinct from the surgical affections of the kidney, there is very little as yet which can strictly be called ureteral surgery; and very few cases have been published which are really cases of unmixed ureteral disease or injury.

Since 1885, only seven cases, so far as I am aware, have been published, purporting to be subcutaneous injuries of the ureter—namely, by Godlee, 1887; Chaput, 1889; Le Dentu, 1889; Coull Mackenzie, 1891; Allingham, 1891; Fenger, 1894; Page, 1894. These are not, however, all cases of injury to the ureter proper, and they do not supply any grounds for altering the conclusions based upon earlier cases.

In view, however, of the growing importance attached to the surgery of the ureter, it is well to describe the injuries of the ureter, and the operations performed and suggested for their relief, apart from those relating to the kidney.

The injuries involving the ureter depend very much as to their symptoms and gravity upon whether they are subcutaneous or open, extra- or intraperitoneal. They may be conveniently considered under three classes:—

(1) Subparietal injuries; or those in which no open wound communicates with the injured ureter.

(2) Penetrating wounds; or those in which an open wound communicates with the injured ureter.

(3) Surgical wounds, accidentally or intentionally inflicted, including those which are caused by the use of obstetric instruments, or following gangrene due to difficult or prolonged labour.

Those which result from gangrene and from overlooked surgical accidents come necessarily for consideration under ureteral fistula; whilst those made intentionally by the surgeon, and recognised accidental wounds, are considered under "Operations upon the Ureter."

In all three classes the peritoneum may or may not be involved. In Class 1, as a rule, it is not; in Class 2 it is most likely to be; whilst in the accidental wounds of Class 3, excepting those produced by obstetric instruments and those caused by sloughing, it almost always is.

In this article I shall confine my remarks to Class 1—that is, to subparietal injuries of the ureter.

Twenty-three cases are now scattered through surgical literature, which have been repeatedly mentioned by writers as subcutaneous injuries of the ureter; but a close examination of the details given of them shows that twelve at least are injuries of the parenchyma or pelvis of the kidney, not of the ureter proper, and there is considerable room for doubt as to the exact nature of the injury in several of the others. The explanation of the fact that cases of ruptured renal pelvis are so often described as ruptured ureter is no doubt in part due to the want of uniformity in the use of terms. The ureter in anatomical works is described as commencing at the renal pelvis; but the term renal pelvis is often used as if it were synonymous with hilum of the kidney, instead of embracing that dilated part of the renal duct which extends from the union of the calyces to the upper end of the ureter proper.

The following is a list of the twenty-three cases to be found in surgical literature, described as "rupture of the ureter." Thirteen of them were more or less fully quoted in my book on the kidney in 1885. Seven others have been published since then. The remaining three had been previously overlooked by me, namely, those by Joel, Cabot, and Bardenheuer. The whole twenty-three cases are now arranged in four different groups.

(A) Verified cases of rupture of the ureter—(1) Poland (with extraperitoneal extravasation and tumour), (2) Coull Mackenzie (with intraperitoneal extravasation, but no tumour).

(B) Probable rupture of ureter with extravasation—(1) Stanley (boy), (2) Godlee, (3) Chaput, (4) Page.

(C) Contracted ureter, with hydronephrosis, etc., possibly due to ureteral injury—(1) Haviland, (2) Pye-Smith, (3) Soller, (4) Cabot, (5) Fenger.

(D) Not injuries of the ureter proper, but rupture of renal pelvis, or renal substance opening calyces, and giving rise to extravasation—(1) Stanley (female), (2) Hilton, (3) Hicks, (4) Barker, (5) Bardenheuer, (6) Dumenil, (7) Joel, (8) Allingham, (9) Harrison (two), (10) Croft, (11) Bennett May.

Besides the above, Dr. W. J. Collins* has published two cases of traumatic hydronephrosis, in which the injury may have been either to the ureter or to the renal pelvis. Dr. Collins thought that the most plausible explanation of one of these cases was occlusion of the ureter, from contraction following bruising at the time the child, æt. 5, was run over; or else compression by blood, or by callus thrown out around a fracture of the pelvis. In neither case was there any direct evidence as to the cause of the hydronephrosis.

Of the twenty-three cases, we find only eleven with any pretensions to be considered injuries of the ureter proper, and of these only two were actually proved to be ruptures of the ureter. One of the two (Coull Mackenzie's) was an undoubted case of intraperitoneal laceration, and was verified as such by *post-mortem* examination. In a patient under my care the ureter was subsequently ascertained by operation to have been torn away from the infundibulum. This case is again referred to on pages 144, 153, and 154.

* *Brit. Med. Journ.*, London, April 30, 1892.

In five cases (Group C) *a tumour was formed by alteration in the kidney itself.* In four of these, contraction or obliteration of the ureter followed the injury, and after a long time a renal tumour formed; in three of them the condition was ascertained by *post-mortem* examination to be, in one, pyonephrosis with atrophy and impermeability of the ureter (Haviland's); in another, pyonephrosis (which had at one time communicated with the colon), with the ureter contracted 1½ in. from its commencement, so as scarcely to admit the smallest probe (Pye-Smith's); and in the third, the kidney was converted into a large polycystic tumour, and the ureter in the middle of its course was almost obliterated (Soller's). In the fourth case the ureter was strictured, and an intermittent hydronephrosis developed ten years after the injury. The hydronephrosis had existed for twenty-four years when Fenger performed ureterotomy from the loin. He divided the stricture, and closed the wound in the ureter by longitudinal sutures, after the Heinecke-Mikulicz method for the treatment of pyloric stricture. The patient recovered, and had no return of the hydronephrosis (Fenger's). In the fifth case (Cabot's) the nature of the obstruction and its precise situation were not ascertained. It is described by Cabot as one of "nephrotomy for hydronephrosis," and resulted in recovery. The swelling developed "several weeks" after a fall, and it seems to me highly probable that the obstruction was only partial and temporary, and was caused by blood clot, either in the renal pelvis or in the ureter, which subsequently became absorbed or passed on into the bladder.

In Haviland's case the injury was received four years before the tumour developed, in Pye-Smith's two years, in Soller's nine, and in Fenger's ten years before. It is very doubtful whether the condition of the ureter in Haviland's and Soller's cases was not due to causes other than injury.

In five cases, namely, those included in Group B and Poland's case, *a tumour was formed by a collection of fluid behind the peritoneum.*

In none of these instances was the precise seat of the extravasation ascertained. Stanley's case was that of a boy in many respects precisely like Croft's and Bennett May's and

others, where the injury was supposed or ascertained to have implicated the renal pelvis and not the ureter.

There is also much room for doubt as to whether the ureter proper was injured in Godlee's case. It is more than probable that the injury was to the renal pelvis, but that it could not be discovered at the time of the nephrotomy, nor, owing to the difficulty in separating the kidney from the surrounding tissues, at the subsequent nephrectomy. We cannot, however, positively exclude either of these cases from the list of injuries to the ureter. The two other cases in this group (Chaput's and Page's) are in great probability veritable injuries to the ureter proper.

Chaput's case is exceptional, in that the cæcum was ruptured on its posterior aspect, and the extravasated urine, not only accumulated in the retroperitoneal tissue, but entered the cæcum through the rupture in its wall, and distended this gut and the neighbouring colon so as to create a very misleading abdominal tumour.

In three of these cases (Godlee's, Chaput's, and Page's), an incision, followed by drainage of the retroperitoneal space, was practised, and in Godlee's case evacuation had been effected before the lumbar incision was made. In each of these three cases nephrectomy was subsequently and successfully resorted to, because of pyrexial attacks due to suppuration of the kidney, and of the persistence of a fistula.

In Page's case the incision was made in the linea semilunaris, and drainage was effected through this. In Chaput's case, as well as in Godlee's, the incision and drainage were through the loin.

The fifth case, in which a tumour formed behind the peritoneum (Poland's), is allied to the four cases just mentioned, though it differs from them in some most important particulars. As the accident resulted in death on the sixth day, the exact nature of the injury was ascertained by *post-mortem* examination.

Poland describes the ureter as torn quite across, just below the renal pelvis; and its broken end, together with the kidney, was surrounded by the half-sloughy, putrescent, and jelly-like tissues behind the peritoneum. The kidney itself was injured, its capsule being separated from it by extravasated

blood; the renal capsule prevented this blood clot from mixing with the urine extravasated through the torn ureter. The right lumbar region was raised in a great swelling, this being moderately dark in colour from some effusion of blood.

It is unnecessary to analyse the twelve cases in Group D, which have been often quoted as subcutaneous injuries of the ureter, but which in reality are not so. It will suffice to give a list of these, with the dates and references to them. This is done at the end of this article.

We will now summarise the result of a careful analysis of the eleven cases above mentioned, with the view of arriving at the causes, pathology, symptoms, and treatment of ureteral subcutaneous injuries.

CAUSES.—Of the eleven cases above enumerated, forcible compression between two hard bodies, at the level of the umbilicus and loin, was the form of violence inflicted in three; kicks from horses in two (Chaput's and Pye-Smith's); the passage of the wheel of a carriage over the trunk in two (Godlee's and Page's); falling on to the back from a height in one (Haviland's); falling down stairs in one (Cabot's); the bursting of a cannon shell in one (Soller's); and a violent jerk in jumping from a horse in one (Fenger's case). It is noteworthy that in both the cases in which the peritoneum was ruptured (Poland's and Coull Mackenzie's) the form of violence was forcible compression of the trunk—between the platform and a railway carriage in one, and between two heavy trucks in the other.

Tuffier has suggested that the ureter gives way by being crushed against the tip of the transverse process of the first lumbar vertebra. This may be the method by which the renal pelvis more often is torn, opposite the hilum of the kidney; but the ureter only commences a little above the level of the tip of the transverse process of the third lumbar vertebra, too low down, therefore, to be crushed against the first transverse process, though it may be so compressed against the tips of the third, fourth, or fifth processes. In Poland's fatal case, in which the ureter at its junction with the renal pelvis was torn right across, the transverse processes

of the three upper lumbar vertebræ, on both sides, were broken off, and the twelfth rib on each side was fractured.

Le Dentu thinks a veritable tear of the ureter may be caused by the sudden and violent downward displacement of the kidney, the weight of which drags forcibly upon the ureter at its junction with the renal pelvis, or at some point lower down than this, namely, at the level at which the ureter retains, during the shock, its normal attachments.

As the kidney is under cover of the lower ribs, and the lower half of the ureter is protected by the bones of the pelvis, it would seem that any great violence, applied either from in front or from behind, will tend to stretch the ureter most severely at one or other extremity of its abdominal course, whilst the intervening portion will escape with the rest of the soft structures in the ilio-costal space. The holdfast influence of the kidney above, and the resistance of the brim of the pelvis below, would thus tend to the giving way of the ureter at its junction with the renal pelvis, or just above the place where it passes over the sacro-iliac synchondrosis.

The fact that in five out of eleven cases the injury was brought about by violent compression of the trunk in the antero-posterior axis, and in a sixth case (Fenger) was caused by overstretching, gives support to this theory.

The intimate adhesion of the ureter to the peritoneum; the readiness with which it becomes detached with the peritoneum, when the latter is torn away from its connections; and the fixation of the peritoneum to the spinal column, make it probable that the peritoneum will yield just external to the line of fixation to the spine rather than that the ureter will give way. Possibly this is what really happens, and thus the ureter escapes.

The fact that the peritoneum over the ureter was injured in only one case out of eleven, and that in five cases out of eleven there was a large retroperitoneal accumulation of urine, without the peritoneum giving way, suggests that in the rare instances when the ureter is ruptured there is less than the normal adherence between the ureter and peritoneum.

Perhaps this helps to explain the greater frequency with which subcutaneous rupture of the ureter occurs in young life; thus, of ten cases in which the ages of the patients are

given, only two were over 30, only one was between 20 and 30, four were between 4 and 10 years of age, and three were between 10 and 16.

The ages at which the accidents happened were 4, 5, 9, 10, 13, 14, 16, 22, 33, 36.

PATHOLOGY.—The actual nature of the injury inflicted on the ureter can only for the most part be imagined, because in only two cases has it been actually seen. In Poland's patient, who died 135 hours after the accident, the ureter was torn right across, below the pelvis of the kidney. The kidney itself was much damaged. In Mackenzie's case there were two small ruptures in the ureter, each of the size of a pea, communicating with the peritoneal cavity.

In both these cases the peritoneum was torn; but only in one (Coull Mackenzie's) did the rent in the serous membrane allow of the entrance of urine into the cavity, and in that case death ensued from peritonitis within twenty-four hours of the accident. In Poland's case, the rupture of the peritoneum was on the anterior wall of the abdomen, and quite distinct from the ureteral injury; the patient died from exhaustion due to vomiting, but there was no peritonitis.

In Mackenzie's case, in which the whole of the peritoneum was described as being highly inflamed, and the intestines matted together by lymph, it is to be regretted that we have no information as to the character of the urine. We know the peritoneum is tolerant of healthy urine; but it was probably the admixture of blood with the urine in the peritoneal cavity that caused the fatal peritonitis.

In five cases (out of the nine in which we have no precise definite knowledge of the exact nature of the injury inflicted) it is necessary to assume that the ureter was more or less completely torn across, or else lacerated in a longitudinal direction, in order to explain the extravasation of urine into the retroperitoneal cellular tissue. In those instances where the ureter was found constricted or obliterated, some long time after an injury, one of several things may have happened. The ureter may, in the first instance, have been simply contused, or its wall may have been only partly torn through, and subsequently have undergone cicatricial contraction, or

occlusion; or the cellular tissues around it may have been the seat of the injury, and the constriction of the ureter may have been the consequence of the subsequent inflammatory changes in those tissues, or of compression by blood clot on its exterior; or, again, the narrowing may have been the result of hæmorrhage from the kidney, and the impaction and subsequent organisation of a blood clot in the ureter—the changes in which, after a time, may or may not have allowed of the passage of urine.

But, however this may be, the inference is obvious, that if the coats of the ureter are completely torn through, and the peritoneum is intact, a tumour will sooner or later be formed by the accumulation of urine in the retroperitoneal tissue; whereas if the ureter, from direct or indirect injury, becomes imperfectly obliterated, a tumour will in course of time be formed, consisting of one or other of the varieties of obstructed kidney, namely, renal abscess, pyonephrosis, hydronephrosis, or, as in Soller's case, a polycystic kidney.

If the ureter were to be at once completely obstructed by blood clot, and permanently remain so, the result to be expected is atrophy of the kidney. Yet this does not necessarily follow, as shown by the *post-mortem* examination on a man æt. 36, whose right kidney was ruptured by the kick of a horse. In this case (recorded by Mr. Holmes)* the ureter, renal pelvis, and calyces were found plugged with blood clot eighteen months after the kidney had been ruptured; the clot in the interior of the kidney communicated with a mass in the perinephric cellular tissue, and the line of rupture could be faintly traced through the substance of the gland, which was quite healed. Both kidneys were small, granular, and cystic, and had probably been so for a year or two before the accident. There was no marked difference in the size and general appearance of the two kidneys.

In two of the eleven cases under consideration, a communication was formed between the urine cavity and the large bowel; in Pye-Smith's case the colon was, at the *post-mortem* examination, found adherent to the pyonephrotic cyst, but the communication had become closed. In Chaput's case, a rupture of the posterior wall of the cæcum allowed of a com-

* *Trans. Path. Soc.*, London, 1860, vol. xi., p. 140.

munication between the bowel and a large retroperitoneal collection of urine.

SYMPTOMS.—The manifestations of subcutaneous rupture of the ureter are not characteristic. For a time there may be no sign whatever, beyond the pain and tenderness caused by the injury. It is only by the subsequent development of symptoms that we are able to learn that any damage has been done to the urinary system, and not even then are we able to say at once whether it affects the renal parenchyma, the renal pelvis, or the ureter.

There may be no immediate indication in the urine of any kind whatever. Hæmaturia may be entirely absent, the urine being passed naturally and freely, as in Stanley's, Godlee's, and Chaput's cases; or slight hæmaturia, of a more or less transient character, may be observed, as in Page's patient, who, after the second day, passed at intervals small quantities of blood with the urine; or there may be well-marked hæmaturia, as in Cabot's case, in which there was bloody urine for three or four days; or, as in Pye-Smith's patient, who had hæmaturia for several days after the injury.

If the ureter alone is ruptured, it is not likely that the hæmaturia will be very considerable or prolonged: though slight hæmaturia, or even the absence of hæmorrhage, is in no way characteristic of ureteral as distinguished from renal injury, because many cases prove that there may be but little, if any, blood in the urine, even though the renal pelvis or the renal parenchyma be wounded.

If, besides injury to the ureter, one or both kidneys are seriously damaged, there may be incomplete or complete suppression of urine. Thus, in Poland's case, there was thrombosis of all the vessels of the opposite kidney, as well as severe damage to that on the side of the torn ureter—very little urine indeed was passed during the few days the patient lived.

A common immediate symptom is pain or tenderness at the part injured. The pain may be referred to the loin, to the front of the abdomen, to the umbilicus, or to the middle of Poupart's ligament. This pain may pass off in a day or two, and the patient may remain quite free till fresh pain is caused

by the development of a tumour. Transient collapse and vomiting may occur.

In some of the cases (Stanley's, Poland's, and Godlee's) there was ecchymosis over the loin, abdomen, and inguinal region, and in Stanley's there was extensive suppuration of the cellular tissue about the loin and sacrum. If the patient survives the injury, a swelling will form on the injured side of the abdomen, or in the corresponding flank, within a period varying from a few days to several years.

The abdominal swelling may be caused either by a collection of urine, or urine and blood, behind the peritoneum, or by one or two of the changes which supervene in the kidney itself. If due to a retroperitoneal collection, the swelling forms much earlier than when due to change in the kidney itself; appearing usually within a few days or weeks in the first event, but only within "many weeks," months, or even years in the latter.

Of the five instances in which the swelling was *behind the peritoneum*, it appeared within a day or two in Poland's case, at the end of the sixth week in Stanley's, and within two or three weeks in the others.

The swelling is usually well defined, palpable from the loin and front of the abdomen, and is round, oblong, or sausage-shaped. It may extend from the thorax into the false pelvis, and may reach the median line of the abdomen.

The length of time which elapses before the appearance of this tumour, depends upon (1) the character of the rupture; (2) the degree of resistance to the escape of the urine offered by the tissue into which it passes; and (3) to the interference —caused by the shock, or by damage—with the secreting capacity of the kidney.

The rent in the ureter may be very small, or, on the other hand, the tube may be torn right across. If separation is complete, the ends may possibly be curled up, as Tuffier tells us was the case in some of his experiments on dogs. Such a condition would offer an obstacle to the escape of urine; it was not, however, found to have occurred in Poland's case, in which the tear was complete, and the ends separated.

A much more likely obstacle will be blood clotted over the orifice, or around the torn end of the tube. Blood clot may

fill the calyces and pelvis of the kidney; or the parenchyma of the kidney may be compressed by blood extravasated beneath the capsule; or the renal vessels may be thrombosed. Under any of these circumstances, urine would fail to escape or even to be secreted.

Again, the cellular tissue may be very dense and not easily opened up, or its meshes may be packed with extravasated blood, and thus much opposition offered to infiltration of urine. The shock of the accident, and the reflex suppression of urine following the injury, would explain only a certain amount of delay.

In injury to the ureter, as in injury to the renal pelvis, it is possible that the escape of urine may only follow the sloughing out of severely bruised tissue, and not take place as an immediate consequence of the original violence.

When the lesion occurs *on the peritoneal aspect* of the ureter, it is to be expected that the escape of urine will be early and profuse, as there is then less resistance to the outflow of urine; and no tumour will be likely to form in the flank.

As soon as the urine, or urine and blood, which have collected in the retroperitoneal space decompose, inflammation, suppuration, or sloughing occurs, and other symptoms then arise, namely, increased pain, redness of the skin in the loin, œdema of the abdominal wall, elevation of temperature to 101° or 102°, or even a degree or two higher, rigors, furred tongue, loss of appetite, and constipation or diarrhœa.

In both cases (Chaput's and Pye-Smith's) in which a communication between the bowel and the urine cyst was found to have existed, diarrhœa or simulated diarrhœa was a noticeable symptom.

The fluid drawn off from the tumour, before suppuration has commenced, has the characters, more or less pronounced, of urine, in colour, odour, and composition; but it is generally slightly alkaline in reaction, of a low specific gravity, *e.g.* 1008 to 1010, and contains very little, perhaps only a mere trace of urea. It will probably also contain a small quantity of albumin, a little blood, and most likely a considerable amount of chloride of sodium. When the parts become septic, the fluid withdrawn will also contain more or less pus.

In Chaput's case the fluid withdrawn on the twelfth and fourteenth days after the injury was sanguinolent, and showed fatty globules and altered leucocytes and red blood corpuscles, and was thought to be the fluid of a hæmatoma on its way to suppuration.

In the five cases in which the swelling was *in the kidney itself* the tumour was noticed at very different lengths of time after the injury. In one case it is stated to have been "several weeks," in others it was two years, four years, and nine years respectively. In Fenger's case, ten years elapsed between injury and hydronephrosis, and thirty-four years between the injury and the ureterotomy by which the intermittent hydronephrosis was remedied.

The nature of the renal tumour was very different in these five cases. One was an abscess-like dilatation of each of the calyces (Haviland's); one a pyonephrosis, the contained fluid being opaque and reddish and loaded with pus and blood cells (Pye-Smith's); in another (Soller's) it was a large polycystic kidney; in Cabot's and Fenger's cases the condition was described as hydronephrosis.

Occurring at such a long interval after the accident, and with the intervening period between the injury and the formation of the renal tumour, perhaps, absolutely without symptoms of any kind, these cases come to have importance clinically, less in relation to injuries of the ureter than to renal enlargements generally.

DIAGNOSIS.—If there is at first little or no hæmaturia and no swelling in the loin, and then after three or four weeks, more or less, a swelling forms behind the peritoneum, rupture of the ureter may be suspected. If many months or even years after an injury in the region of the ureter, a tumour of the kidney is formed, though there has been an absence of symptoms, or only slight hæmaturia at the time of the injury, there will be ground for suspecting traumatic contraction or occlusion of the ureter.

It is, however, impossible to distinguish injured ureter with extravasation, from injured renal pelvis with extravasation; injured ureter with complete obstruction by clot or recurved ends is equally indistinguishable from injured kidney

with clot plugging the renal pelvis or the ureter. Nor is this impossibility of exact diagnosis of any practical importance, because the treatment must be the same.

Some assistance may perhaps be obtained, where an opening in the ureter is believed to exist, by distending the bladder with water. Kammerer found that the water escaped by the defective ureter until the bladder was quite distended, and then, doubtless through closure of the valvular entrance in the bladder, the water ceased to flow. Le Fort and Page applied this test in their cases but without effect.

M. Tuffier thinks that a constant escape of urine, after a wound of the ureter, is the leading distinction between these injuries and wounds of the kidney. Wound of the kidney, he says, will cicatrise easily and rapidly, and give rise to no extravasation of urine, whilst wounds of the ureter have less tendency to natural cure. If by "wounds of the kidney" Tuffier means also wounds of the renal pelvis, and wounds opening the calyces through the renal parenchyma, facts are against him. Even if this were a leading distinction it would give no aid to diagnosis in subcutaneous injuries.

PROGNOSIS.—In cases not complicated with other serious injuries, the immediate effect of these accidents is not to endanger life, if the peritoneum is uninjured. If prompt and decided surgical treatment were adopted, the consequences to the kidney itself would be less unfavourable; and subsequent nephrectomy would probably be less frequently required than has been the case hitherto.

When the peritoneum is involved the outlook is most serious; in both the fatal cases the peritoneum was injured, and in one of them the cause of death was peritonitis. In the other case the wound in the peritoneum was not in the neighbourhood of the kidney or ureter, and no evidence of peritonitis was found at the *post-mortem* examination.

TREATMENT.—The ideal treatment for subcutaneous rupture, whether in a longitudinal or transverse direction, is immediate suture or anastomosis of the ureter, according to the character of the wound. But it is useless to state that this is the treatment at once to adopt, when the indications of

the exact injury do not occur until weeks after the rupture has taken place; when there is nothing even then to indicate the site of the rupture, and when the retroperitoneal tissues have become changed by the pressure and inflammation caused by the extravasated fluid.

Puncture of the retroperitoneal cyst has been adopted but with uncertain result. Stanley's doubtful case was tapped six times, and yet the tumour occurred again, and persisted as long as the boy was under observation. We must remember, however, that a repetition of punctures has been followed by the complete and permanent disappearance of the swelling, in cases of retroperitoneal extravasation, due to rupture of the kidney or renal pelvis, and also in cases of traumatic hydronephrosis. Whilst in some of these cases, in which the tumour ceased to refill, the ureter may have become patent, it is probable that in most of them the kidney ceased to secrete, and atrophied—a result which cannot be regarded as satisfactory.

Lumbar incision.—A free incision in the ilio-costal space will secure the complete evacuation of the extravasated fluid; and drainage will obviate the reaccumulation of urine subsequently escaping through the ruptured tube. If the ureter is not completely torn across, the experience afforded by the removal of calculi from its upper end would lead one to expect the ultimate cicatrisation of the wound, and the re-establishment of the ureteral channel.

Through the lumbar incision it will be possible to explore the renal pelvis, and if the state of the kidney indicates that the urine has escaped at some point in the ureter, and not from the kidney, the loin incision may be prolonged in a direction towards Poupart's ligament, passing about a finger's-breadth in front of the anterior superior spine of the ilium. It will no doubt be very difficult to trace the ureter in tissues which have been changed in structure, and when its normal position is disturbed in consequence of the previous extravasation. The search, however, may be somewhat facilitated by remembering that the ureter is carried forward with the detached peritoneum; and that it is intimately attached to that membrane about half an inch, or little more, external to where the peritoneum is tied down to the side of the spinal

column. If a rent in the ureter should happen to be found, it should be repaired by suture, or ureteral anastomosis.

In none of the cases, however, which have hitherto been operated upon has the site of the injury been ascertained. Page says that the thought of closing the wound by suture occurred to him when he laid the cyst open, but the portion of the ureter visible was intact, and as it coursed away from the region of the kidney he did not think it desirable to follow it.

It is to be expected, however, that by a more extensive parietal incision, a freer search for the rupture, and with the aid of the ureteral catheter, the actual wound may be found and directly treated in future cases.

The proposal to apply an aseptic ligature to the torn upper end, with the object of inducing atrophy of the kidney, is to my mind very unsurgical. If the rent can be closed by sutures, so as to restore the continuity of the ureteral channel, this should be done. If the rupture cannot be found, the loin incision followed by drainage will put the damaged parts into the most favourable condition for repair. We have abundant evidence that wounds of the renal substance and renal pelvis, and also of the ureter itself, made by the surgeon for removing calculi, will ultimately heal without the aid of sutures. It should be the surgeon's object, therefore, to put accidental wounds of the ureter, which he cannot localise, and therefore cannot suture, under the same conditions favourable for cicatrisation, as he places wounds of his own making in operations on the kidney and its duct.

If the ureter is completely torn asunder, and its ends can be approximated, they should be united by one of the recognised methods of ureteral anastomosis. If its ends cannot be joined together, then a permanent fistula opening on the loin is the result to be expected. Such a fistula, by possibly saving the integrity of the kidney, would be the means of preserving the patient's life, if his other kidney happened to be destroyed, or he had but one. On the other hand, if the second kidney is sound, and the fistula badly tolerated by the patient, nephrectomy is the final resort.

In a case of my own (published in the *Clinical Journal*, 1st August, 1894), in which there was rupture of the renal

pelvis, a permanent lumbar fistula followed, and continued (with two or three short intermissions, attended by fever and local inflammatory symptoms) for seven years. The quantity of urine escaping by the fistula during this time gradually diminished, and finally ceased; and the fistula then remained closed for three years. At the end of this period fresh suppuration occurred, and an abscess was opened by an incision made through the old scar. A purulent fistula resulted, and was attended with considerable pain and inflammatory swelling in the loin. On this account an exploration was made at the end of a few weeks, through an incision from the loin to the internal abdominal ring. Search was made of a very thorough and extensive character, the peritoneum being widely detached and raised inwards (it was also opened in the process accidentally), but not a trace of kidney could be found, and the ureter diminished in calibre, and, tapering and completely closed at its renal end, was excised. Recovery followed. In all probability the renal pelvis was lacerated, and the ureter completely torn away from the infundibulum at the time of the accident; but the condition could not be ascertained at the time of the original opening of the perinephral extravasation, nor in the less extensive exploration which was made two years after the original injury.

Of course, after lumbar incision, it would be requisite to use all customary precautions against sepsis; and if this is done successfully, and the lumbar incision has been made soon after the first development of the swelling, there is little, if any, reason why the kidney should become the seat of suppurative changes. It was, however, found that the kidney suppurated in all three of the cases in which the retroperitoneal collection was drained; but in one of them (Godlee's) there was pus in the fluid withdrawn when the cyst was first punctured, and before it was laid open by lumbar incision. In another (Chaput's) there were special conditions favouring sepsis, because there was a communication between the large bowel and the retroperitoneal collection of urine; and in the third case the drainage was imperfect, being made through the linea semilunaris, instead of through the ilio-costal space behind.

Nephrectomy. — Nephrectomy will be required, after drainage has failed, if pus in the extravasated fluid, continued high temperature, or recurring pyrexial attacks, with pain, loss of appetite, and emaciation, make it clear that the kidney or the retroperitoneal tissue is the seat of extensive suppuration. Nephrectomy may be required also in the absence of suppuration, if a permanent fistula has resulted, and is a source of intolerable discomfort to the patient In a case of intraperitoneal rupture, ligatures might be applied to the ends of the ureter above and below the wound, or nephrectomy might be indicated; but some form of ureteral anastomosis should be practised if the patient's condition warrants it.

It has sometimes been stated that primary nephrectomy would be the best treatment in all cases of subcutaneous injury, whether of the kidney, renal pelvis, or ureter, attended with retroperitoneal extravasation of urine; but I am not of this opinion. P. Wagner,* though he says that in injury of the ureter the kidney concerned is almost certainly lost to the organism, is, however, of opinion that it is more correct to defer nephrectomy, and first await the formation of a ureteral fistula, and then make an attempt at repair, before operating on a kidney which is itself uninjured.

Nephrectomy may be entirely avoided by the rapid atrophy of the kidney after injury to and obliteration of the ureter. Undoubtedly the danger of primary nephrectomy for severe injury is not inconsiderable; but, on the other hand, the chances of recovery after secondary nephrectomy for septic nephritis are less than after primary nephrectomy for injury. The chance of recovery, with perfect function of the kidney on the injured side, ought, however, when the kidney itself is not irreparably injured, to be given to the patient. This will be done by a prompt incision through the loin, as soon as a retroperitoneal swelling is formed, followed by free drainage into antiseptic dressings. Should this not succeed, secondary nephrectomy will very probably save the life of the patient. It did so in all three cases referred to above, and has done so in several similar cases, where the substance of the kidney or the renal pelvis has been torn.

* *Deutsche Ztschr. f. Chir.*, Leipzig, 1892, Bd. xxxiv. S. 102.

In traumatic hydronephrosis a trial of ureterotomy for division of the stricture should be made, as was so successfully carried out in Fenger's case.

Abstracts of the Eleven Cases regarded as Subcutaneous Ureteral Injuries.

Group A.—*Case* 1.—Poland's case* was that of a woman, æt. thirty-three, in the fifth month of pregnancy, who was squeezed and slowly twisted half a revolution between the platform and the footboard of a railway carriage. On admission there was a small superficial wound of the abdominal wall, about 1½ inch to the left, and a little above the umbilicus, with a subcutaneous laceration of the peritoneum and rectus muscle sheath, through which, on the fourth day, 16 inches of intestine bulged. On the fifth day she aborted, and on the sixth died of *asthenia*.

A few drops of urine were passed on the afternoon of the fourth day, but as this was with the motion, and was thrown away by the nurse, it was not ascertained whether blood was mixed with it or not.

A *post-mortem* examination revealed fracture of the spinous processes of all the lumbar vertebræ, both twelfth ribs, and both transverse processes of the upper three lumbar vertebræ. The right lumbar region was raised into a great dark swelling by blood effusion. The right ureter was torn quite across, just below the pelvis of the kidney, so that it terminated in a ragged end in the midst of the half-sloughy, putrescent, jelly-like tissues which surrounded the organ. The capsule of the right kidney was separated from the parenchyma by a considerable quantity of blood clot, extravasated over the anterior aspect of the organ, and prevented the mixing of this blood with the urine extravasated from the ruptured ureter. The blood under the capsule was derived from a rent on the posterior and lower part of the organ, which penetrated to and opened a vein at the base of one of the pyramids. The left kidney was in a very remarkable condition; it had a buff-pink or yellow-clay colour, very opaque and dead-looking. On section, the whole of the vessels were blocked up with *ante-mortem* clot, which extended in both artery and vein to the principal vessel. In the trunk vein the clot was non-adherent; in the artery it was firmly adherent, but there was no wound of the arterial coats.

With such extensive damage to the kidney tissue it is impossible to draw any accurate conclusions from this case as to the symptoms due to rupture of the ureter.

The suppression of urine was evidently due to compression of one gland by subcapsular hæmorrhage, and thrombosis of all the vessels of the other. The case, besides other points of interest, affords an illustration of subcapsular extravasation of blood in the kidney, a form of

* *Guy's Hosp. Rep.*, London, 1868, 3rd series, vol. xiv. p. 86.

injury to which attention has not yet been specially drawn, but of which I have seen three or four marked instances.

Case 2.—Coull Mackenzie's case is the only example of extravasation of urine into the peritoneal cavity, due to a subcutaneous injury of the ureter.*

It is that of a coolie who was jammed between two heavy trucks. There was no external mark of injury. There were two small ruptures, each the size of a pea, in the right ureter. The abdominal cavity contained two pints of urine mixed with blood. The patient died from peritonitis, following the extravasation through the ruptures of the ureter. This case affords no special symptoms beyond such as are caused by fatal perforative peritonitis.

GROUP B.—Four cases (Stanley's, Godlee's, Chaput's, and Page's), in each of which there was a retroperitoneal collection of urine, were possibly instances of rupture of the ureter.

Case 3.—Stanley,† in a paper on rupture of the ureter, records the case of a boy, æt. nine, who was squeezed between the wheel of a cart and the curb-stone. The immediate consequences were contusion of the soft parts around the pelvis, and great pain in the lower part of the abdomen, much ecchymosis and extensive suppuration in the subcutaneous cellular tissue around the pelvis, from which several ounces of matter were discharged by puncture near the left sacro-iliac synchondrosis. By the end of the sixth week these soft parts had recovered, but a large, circumscribed, oblong swelling was found in the right side of the abdomen. The urine was passed naturally throughout.

From this swelling, fluid having some of the characters of urine was withdrawn by puncture with a small trocar and cannula. The swelling recurred again and again.

It was punctured altogether six times in a period of five months and a half. It refilled again, and extended from the linea alba to the right lumbar region, but further evacuation was considered inexpedient, and the boy was discharged from the hospital nine months after the accident. Subsequently he was often seen in good health, but with the abdominal swelling distinct.

Thus in this case of Stanley's, which, ever since Poland referred to it in 1868, has been quoted over and over again as one of ruptured ureter, we have no proof whatever of the exact part injured, nor of the ultimate result of the injury. It is more likely to have been a ruptured renal pelvis than a ruptured ureter.

Stanley states that by his exploratory puncture he learnt that the fluid was situated immediately beneath the abdominal muscles, and had formed for itself a cavity, by detaching the peritoneum from the

* "Med.-legal Experiences in Calcutta," Edinburgh, p. 98.

† *Med.-Chir. Trans.*, London, 1844, vol. xxvii.

abdominal and lumbar muscles. As to the source of the effused urine, he quotes the opinion of Mr. Taylor, who analysed the fluid, "that, owing to the absence of mucus in it, the probable source was high up in the urinary apparatus, as at the commencement of the ureter." This means only that Mr. Taylor did not think the urine he examined had remained in the bladder.

The other case in Stanley's paper is specifically stated by Stanley as being one of ruptured pelvis of the right kidney, the nature of the injury having been ascertained by *post-mortem* examination.

Case 4.—R. J. Godlee,* in an interesting communication in May, 1887, on "Three Cases of Abdominal Cysts following Injury," recorded the case of a little girl, æt. 4, who had been run over by a cab. Pain, tenderness, and burning in the left inguinal and lumbar regions resulted. Nothing further was revealed until a fortnight had elapsed, when an indefinite swelling in these parts was detected. Within three weeks from the date of injury, this had developed into a large, well-defined, fluctuating tumour, which extended from the iliac spine to the level of the eighth rib, and reached to within half an inch of the median line in front. No change had been observed in the urine. By the aspirator a large quantity of turbid alkaline urine was withdrawn, containing 3 per cent. of urea, much albumin and mucus, a small quantity of pus, and some phosphate crystals. The cyst refilled within two days, to the same size as before. At the end of one month from the date of the injury, an incision was made in the ilio-costal space, and a drain inserted. Then followed a copious and persistent leakage of urine from the wound and a series of pyrexial attacks, so that, at the end of three months and a week after the original injury, lumbar nephrectomy was performed.

Mr. Godlee had great difficulty in finding the kidney, which was situated at the upper and anterior part of the sac, pushed forward with the peritoneum; and great difficulty in removing it, as it was embedded in dense fibrous tissue. The child recovered, but with a fistula.

It was assumed before the nephrectomy was undertaken that the ureter was completely ruptured, "because no blood had appeared at any time in the urine, and if the laceration had been in the kidney it would probably by this time have closed." The history of cases of injury to the kidney shows, however, that these reasons are not sufficient for this conclusion.

The absence of blood in the urine, and the persistence of the escape of urine from the wound prior to the nephrectomy, are symptoms which have often been met with in cases of ruptured renal pelvis.

No description is given of the kidney removed, and one is led to infer that it was taken away piecemeal, and that it was impossible to tell whether the renal pelvis and the renal substance had been injured

* *Trans. Clin. Soc.*, London, vol. xx. p. 219.

in the first place or not. There is difficulty in accepting the fistula in this case as evidence that the ureter was torn across; it seems improbable that a detached portion of the tube would cause more trouble than the open end of the ureter, or even a large part of the expanded renal pelvis, which in many cases has been left behind to form part of the stump of the pedicle.

CASE 5.—M. Chaput* reported the case of a lad, æt. 16, who is described as having had his right ureter and the back of the cæcum ruptured by a kick from a horse's hock in the right flank. The case was one of great difficulty of diagnosis, and the operative treatment was complicated by opening the peritoneum and the front wall of the cæcum. The surgical wound in the front and the traumatic rupture of from 1 to 2 cms. in the back of the cæcum were sutured, and a large perinephric extravasation was incised and drained through the loin, but subsequently the kidney was removed, because of the persistence of the fistula and the general state of the patient. An examination of the kidney after removal showed it to be in a state of general ascending suppurative pyelonephritis. Its lower extremity was very friable, and bathed in a collection of pus. The renal pelvis was quite intact, and absolutely without sign of rupture, as was also the ureter for a distance of from 1 to 2 cms., but the actual seat and nature of the rupture below this point was not ascertained.

It is a question whether the friable, pus-bathed condition of the lower end of the kidney was due to injury which had ruptured the calyces and allowed escape of urine into the surrounding tissues, or whether it was due to changes subsequent to rupture of the ureter.

CASE 6.—Herbert W. Page, *Ann. Surg.*, St. Louis (May, 1894) reported the case of a boy, æt. 5, who was knocked down on September 24th, 1892, by a light vehicle, the wheel of which was said to have passed over the abdomen.

There was no immediate evidence of injury, but within two days blood was noticed occasionally in the urine.

The temperature rose to 100° and 102° on two days, and then returned to normal. Twenty days after the injury the temperature rose again to 100° and 103°, and a swelling formed in the right iliac fossa, accompanied by abdominal tenderness and impaired respiratory movements.

On 27th October the abdomen was opened along the right linea semilunaris, and some clear serous fluid escaped from the peritoneal cavity.

Forty ounces of fluid, having some of the characters of urine, were removed from the swelling behind the peritoneum, the edges of the cyst wall were attached to the anterior parietal peritoneum, and the space drained.

* *Bull. et mém. Soc. de chir. de Paris*, 13 Mars, 1889.

The kidney and upper two inches of the ureter were exposed to view, and found to be uninjured and healthy. The ureter below this part was not visible, and it was concluded that the urine had escaped through a rupture in it lower down.

In November nephrectomy was performed, because of the continued scape of purulent urine from the retroperitoneal cavity and the high ever. The kidney was then found to be three times its normal size, and in a state of ascending suppurative nephritis, the renal pelvis was distended with purulent urine, and this, as well as the upper part of the ureter, was entire. The bladder had previously been proved by injection to be intact. The child ultimately recovered completely. The actual lesion of the ureter, however, was never seen, and some doubt may possibly be felt about it.

GROUP C.—The five cases on record in which either abscess-like dilatation of the calyces of the kidney, polycystic disease, or hydronephrosis has been attributed to injury of the ureter, are the following :—

In three of them (Haviland's, Pye-Smith's, and Soller's) it was proved *post-mortem* that the ureter of the affected kidney was at some point contracted or obliterated, and the history in each case suggests that this might have been caused by an injury to the loin, received at periods of four, two, and nine years respectively before death.

In the fourth case (Cabot's), recovery without a fistula ensued after nephrotomy and drainage. The exact nature of the injury in this case was not ascertained, and it is therefore not possible to say that it was the ureter and not the renal pelvis that was damaged.

The fifth case, Fenger's, was one of subcutaneous injury, followed by stricture of the ureter, and resulting in intermittent hydronephrosis. It was cured by ureterotomy, with closure of the divided wall of the strictured portion by the Heinecke-Mikulicz method.

CASE 7.—In Haviland's case,* a lad, æt. 18, sustained a fall on his back from a height of 20 ft., four years before his death. For several years he had been subject to a painful incontinence of urine, great pains in the loins and urinary passages, the urine being throughout charged with pus and sometimes with blood. After death the right kidney was found to have lost all its original structure, and to be converted into a series of sacs, containing pus-like fluid, each cavity being lined with a distinct membrane, which, when separated, preserved its shape. The cavities appeared to have no outlet, and the ureter was atrophied and impervious.

Some doubt must be felt as to this condition being the result of injury rather than of tuberculous disease, especially when we consider the history and the changes in other parts of the urinary organs. Thus the right kidney contained a similar cavity, and the corresponding ureter was considerably enlarged and embedded in fat, in which were a great

* *Trans. Path. Soc.*, London, 1895, vol. x. p. 209.

number of indurated lymphatic glands; the bladder was contracted and its mucous membrane covered with pus, the urethra being in a similar condition.

The parents attributed the boy's illness to his fondness for bathing, affirming that up to his thirteenth year he was perfectly healthy.

The fall seems to have occurred about a year later than this, when the lad was fourteen, and he only received a shaking, from which he soon recovered.

CASE 8.—In Pye-Smith's case,* a young farrier, æt. 24, had been frequently kicked in the abdomen, and on one occasion, about two years before death, hæmaturia of several days' duration occurred after a kick from a horse on the left side, "under the short ribs." He was only in bed three days, and after recovering, till his last illness, felt no inconvenience and had no return of blood in the urine.

The final illness was ushered in with diarrhœa and an abdominal tumour, attended with pain and vomiting. The tumour was tapped more than once, and several pints of opaque reddish fluid containing pus and blood cells were drawn off. Diarrhœa recurred, and ended in the patient's death. On *post-mortem* examination the kidney was found dilated into a series of sacculi, communicating with each other and with the renal pelvis, and contained a yellow puriform fluid, like that which had been removed during life. A communication had been established between the interior of the kidney and the adherent descending colon, which explained the diarrhœa and the presence of intestinal matter in one of the renal pouches. The ureter was dilated for 1½ inch, when it suddenly became contracted, so as not to admit the smallest probe. A few lines further on it again assumed its normal size. Dr. Pye-Smith seems to have taken pains to exclude calculus, tubercle, and other possible causes of the ureteral contraction.

CASE 9.—M. J. Soller, Interne des Hôpitaux de Lyon,† reported the case of a joiner, æt. 45, who nine years before, during the campaign of 1870, received in the left hypochondrium, below the last rib, a blow from the bursting of a shell, which did not penetrate or even involve the skin. After the injury he felt continually a violent pain on the left side, at the level of the part struck, which was augmented by cold or changes of temperature. A year and a half afterwards his left testicle suppurated, but recovered. The pain in the left hypochondrium led to difficulty in respiration, amounting almost to suffocation, and was accompanied by violent beating of the heart. These symptoms increased up to 1879, when the signs of nephritis developed, and were followed by ascites, anasarca, anæmia, convulsions, and death in August, 1880.

At the *post-mortem* the left kidney was enlarged one-third, and consisted of a congeries of cysts of varying sizes and contents, separated

* *Trans. Path. Soc.*, London, 1872, vol. xxiii. p. 159.

† *Lyon méd.*, 1880, tome xxxv. p. 333.

by partitions of fibrous tissue. All the renal tissue had disappeared. There was considerable hydronephrosis, and the renal pelvis was filled with seropurulent fluid. The ureter was the size of a quill pen, with thickened walls, and in the middle of its course it was so contracted as to scarcely admit the head of a pin. At the level of the contraction of the ureter the cellular tissue surrounding was indurated and chronically inflamed. The right kidney was very much congested.

This was not a case of rupture, but of contusion of ureter, I should say. Had there been rupture there would surely have been extravasation. If the conglomerate cystic condition was (and in all probability it was) developed after the accident, it supports the theory of the cysts being due to obstruction, not to an adenomatous change.

CASE 10.—Dr. A. T. Cabot* reported the case of a boy, æt. 10 years, who for three or four days after falling down stairs passed bloody urine, and several weeks later developed a swelling which increased into a prominent fluctuating tumour, filling the right side of the abdomen.

It was twice aspirated, and large quantities of a clear, slightly yellow fluid, having the characters of altered urine, were withdrawn. The fluid was alkaline, had a specific gravity of 1007, and contained one-fourth of albumin, red and white blood corpuscles, and large round cells in varying numbers. Urea in small amount was discovered at the second tapping. As the fluid re-accumulated, a vertical incision was made in the ilio-costal space, and the cyst wall incised and stitched to the skin. "The finger passed into the cavity felt a soft nodular mass, probably the kidney, in the posterior part of the cyst. The ureter could not be felt." Between two and three kinds of amber-coloured fluid escaped, having similar characters to that previously withdrawn, but in addition indican, chlorine, uric acid, and triple phosphate crystals, and round cells like renal epithelium, were noted.

The boy recovered without fistula, five and a half weeks after the operation. The case was reported by Cabot as one of "nephrotomy for hydronephrosis," and the treatment described of the cyst wall, the character of the fluid, and the position on the posterior instead of on the anterior wall of the cyst, of what he took to be the kidney, support this view. There is nothing in the description which is proof of the injury having been ruptured ureter. The case was doubtless one of traumatic hydronephrosis, from blood plugging the ureter.

CASE 11.—Fenger's case was published in the *Chicago Medical Recorder* for March, 1893. It is described by Fenger himself as one of "traumatic stricture of the ureter close to its entrance into the pelvis of the kidney," causing intermittent hydronephrosis. The patient, who was 47 years of age, had sustained an injury thirty-four years previously. Hydronephrosis developed ten years afterwards. Lumbar nephrotomy disclosed no calculi. The ureteral orifice could not be

* *Boston Med. and S. Journ.*, 22nd February, 1883.

discovered through the renal incision; the dilated pelvis was then explored, but still the orifice of the ureter could not be found. The ureter was then isolated, and its upper end found to be embedded in cicatricial tissue for half an inch. Lower down, though small in calibre, the duct was normal.

A longitudinal incision, 1 cm. long, was made in the ureter just below the cicatrix. The strieture itself was 1 cm. in length, and was incised upwards into the renal pelvis. The ureteral wound was then stitched longitudinally, according to the Heinecke-Mikulicz procedure in the treatment of pyloric stricture. No bougie was left in the ureter. A drainage tube was passed into the pelvis through the wound in the kidney. The patient made a good recovery without return of the hydronephrosis. This operation was performed on 26th November, 1892.

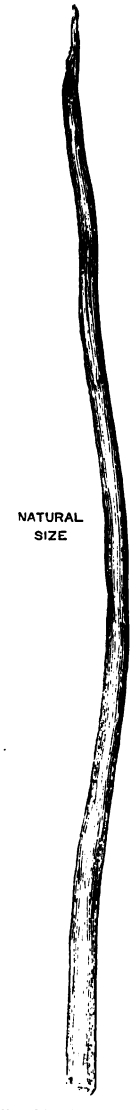


Fig. 29.—Ureter removed ten years after rupture.

CASE 12.—Morris's case was incomplete when published in the *Clinical Journal* of 1st August, 1894.

A strongly-built man, æt. 30, fell from his van, one of the wheels of which caught him a blow in the right loin. This was on 30th September, 1887. One of his ribs was fractured, and he passed a little blood from his bowel for a few days; but no blood was detected in his urine at any time. Morphia was required to relieve abdominal pain during some days. On 26th October, though he had been resting the whole time since the accident, a painful swelling appeared in his right loin, which rapidly increased. The next day, 27th October, Mr. Morris made a lumbar incision and let out over 100 oz. of slightly blood-stained urine. A large rent was felt in the renal pelvis, but it was not detected at the time that the ureter was torn away from the infundibulum. A permanent drain was kept up, and from 24 to 30 oz. of urine daily passed through the right loin; a similar quantity was passed by the bladder.

In September, 1888, he returned with a large swelling in the right loin, which had formed since he had discontinued the drainage, and the fistula had been allowed to close. This swelling was evacuated, more pus than urine escaping, and the drain re-introduced. The same neglect of drainage was followed by the same sequence of events in June, 1889. An ineffectual

search was made at this time for the kidney, with a view to nephrectomy. A drainage tube attached to a urinal was again introduced, and he was urged to continue to wear it. This he did—following his occupation, and in perfect health the while—till the fistula finally closed in July, 1894. The amount of urine discharged through the fistula had for a long time previously been gradually diminishing. He remained well till October, 1897, when a fresh abscess formed, and was opened through the old scar. This did not quite heal up, but swelled up and became inflamed from time to time. For this reason he requested to have another operation. On 15th November, 1897, a long curvilinear incision was made, as for nephro-ureterectomy, and a most careful and thorough search instituted for the kidney. Only a flattened fig-shaped mass of fibrous tissue occupied the place of the kidney. The ureter was next sought for where it crosses the iliac vessels, and was found and traced nearly up to this fibrous mass. As this point was reached, and whilst a little traction was being made upon the ureter, it tore away from its upper connections. It was a very slender tube, quite closed at its renal end, where it has the appearance faithfully shown in the accompanying figure. The man made an excellent recovery.

GROUP D.—Cases usually quoted as rupture of the ureter, but which are really cases of rupture of the renal pelvis, or renal substance opening calyces.

ALLINGHAM, H.—*Brit. Med. Journ.*, London, 1891, vol. i. p. 699. BARDENHEUER.—"Drainerung der peritonealhohle," 1881, S. 1733. BARKER.—*Lancet*, London, 17th January, 1885. BENNETT, MAY.—*Brit. Med. Journ.*, London, 1883, vol. i. p. 669. CROFT.—*Trans. Clin. Soc.*, London, 1881, vol. xiv. (traumatic hydronephrosis). DUMENIL, M., quoted by LE DENTU, "Affections chirurgicales," 1889. HARRISON.—"Surgical Diseases," p. 328; "Lectures on Surgical Disorders of the Urinary Organs," 1880. HICKS.—*Med. Rec.*, N. Y., 17th April, 1880 (traumatic hydronephrosis). HILTON.—*Guy's Hosp. Rep.*, London, 1867, 3rd series, vol. xiii. JOEL.—*Bull. Soc. méd. de la Suisse Rom.*, Lausanne, July, 1870. STANLEY.—*Med.-Chir. Trans.*, London, 1844, vol. xxvii.

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Hunterian Lectures for 1898.

TABLES OF TWO HUNDRED AND SIXTY-SEVEN CASES OF RENAL OPERATIONS PERFORMED BY THE AUTHOR UP TO THE FIRST WEEK IN MARCH, 1898; TOGETHER WITH A TABLE OF FORTY-NINE COLLECTED CASES OF OPERATION FOR CALCULOUS ANURIA.

TABLE I.—CASES OF

PERFORMED BY

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1880	1	M M.	Female.	19	Excessive pain and tenderness in right loin. Great hæmaturia, quite disabling her from work. Symptoms acute for 17 months. Occasional pain in right side for 11 years.
1884	2	E. G.	Male.	24	Shooting pains to left testis, and tenderness in left loin. Some hæmaturia. Frequency of micturition. Symptoms for 2 years.
1886	3	J. M.	Male.	42	Pain in right loin. Hæmaturia. Symptoms for 19 years.
1887 (P)	4	Mr. H.	Male.	25	Tenderness and aching in left loin. Hæmaturia and slight pyuria. Never colic. Kidney felt hard. Symptoms 9 years; worse of late.
1888	5	A. H.	Female.	26	Pain in both loins, but chiefly in right, for 4 years. Hæmaturia. Slight pyuria. Oxalate of lime crystals. Tenderness in right loin. Frequency of micturition for 1 year.
1889	6	K. V.	Female.	21	Pain in right loin for 4 years. Swelling for 1 week, which is freely movable. Hæmaturia and albuminuria.
1889	7	J. H. M.	Male.	27	Pain and passage of calculi. Slight pyuria. Repeated attacks of pain for 8 years.

NEPHROLITHOTOMY.

MR. HENRY MORRIS.

Date of Operation.	Result.	Remarks.
Feb. 11th, 1880, R. Kidney.	Recovered.	Incision into anterior surface of kidney near hilum. Recovered with a sinus 1 inch to 1½ inch long, not communicating with the kidney. Wt. of calculus, 31 grains. (*V. Trans. of Clin. Soc.*, Vol. 14, 1881.)
May 10th, 1884, L. Kidney.	Recovered.	Incision into ant. and lower part of kidney. No sinus. Wt. of calculus, 89½ grains. (*V. Trans. of Clin. Soc.*, Vol. 18.)
May 15th, 1886, R. Kidney.	Recovered.	No sinus. Wt. of calculus, 23½ grains. (*V. Trans. of Clin. Soc.*, Vol. 20.)
Mar. 16th, 1887, L. Kidney.	Recovered.	Calculus removed from pelvis. Wt. of calculus, 213 grains. No sinus. Nephrotomy and nephrectomy ten years after for recurrent calculus. (*V.* Table II., No. 43, and Table III., No. 13.)
Jan. 18th, 1888, R. Kidney.	Recovered.	Incision into ant. aspect of kidney. No sinus. Wt. of calculus, 109 grains.
May 22nd, 1889, R. Kidney.	Recovered.	One large stone and 7 fragments removed. Total weight of calculus, 1,303 grains. Urinary sinus followed. Subsequent left nephrolithotomy, 1890, and right nephrectomy, 1891. (*V.* Table I., No. 9, and Table III., No. 7.)
July 31st, 1889, R. Kidney.	Recovered.	Three calculi removed from kidney. Wt. of calculi, 69 grains. No sinus.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1890	8	F. J.	Male.	23	Pain on right side. Hæmaturia. Passed blood in urine when a child, and had had pain for 10 years.
1890	9	K. V	Female.	22	Pain in left loin very severe.
1890	10	A. P. A.	Male.	40	Pain and tenderness in left loin for more than 20 years.
1890	11	E. J. S.	Male.	34	Pain in left loin for 2 years. Hæmaturia, pyuria, and oxalate of lime crystals.
1891	12	J. J	Male.	35	Pain and swelling in right loin for 1 year. Hæmaturia and pyuria.
1891	13	J. A.	Male.	26	Pain and tenderness in left loin and hæmaturia for 2 years.
1891	14	F. H.	Male.	48	Pain in left loin for 5 years, and hæmaturia on three occasions 3 or 4 years ago, but not since. Frequent severe colic during last 4 months. Pain shooting into left groin.

Date of Operation.	Result.	Remarks.
Feb. 23rd, 1890, R. Kidney.	Recovered.	Incision into ant. aspect. Three branched calculi were removed from the renal substance, and a much larger one from the pelvis. Total wt., 200 grains. Recovered without a sinus.
Apr. 23rd, 1890, L. Kidney.	Recovered.	Incision into pelvis of kidney. Wt. of calculus, 513 grains. Sinus present, but not urinary sinus. (For previous nephrolithotomy, *v.* Table I., No. 6; and for subsequent nephrectomy, *v.* Table III., No. 7.)
June 7th, 1890, L Kidney.	Recovered.	An oxalate of lime calculus was removed from the cortical part of the kidney. Wt. of calculus, 62 grains. No sinus remained.
Aug. 29th, 1890, L. Kidney.	Recovered.	Incision into ant. aspect, and stone found lying in the kidney substance close to the pelvis. Wt., 129 grains. No sinus remained.
Feb. 11th, 1891, R. Kidney.	Recovered.	Incision into ant. aspect and extraction of a stone. No sinus. Wt. of calculus, 27½ grains.
Apr. 29th, 1891, L. Kidney.	Recovered.	Incision into ant. surface near hilum. No sinus. Wt. of calculus, 34 grains.
May 9th, 1891, L. Kidney.	Died May 13th, with symptoms of uræmia and intense mental agitation.	The patient was a very stout man, and the kidney very difficult to reach through an oblique wound 12 inches long, joined by a vertical incision 3 inches long. Brisk hæmorrhage followed renal incision, but was soon stopped by pressure. Two stones were removed. P.M. wound in left kidney 1½ inch long. Left kidney weighed 7½ ounces, and was fatty. Right kidney, 5½ ounces, fatty, as were also the liver and the heart. Small branch of renal vein divided and plugged by recent clot. No injury to peritoneum. Wt. of calculi, 19½ grains.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1892	15	J. L.	Male.	35	Pain in left loin, radiating to scrotum. Hæmaturia. Frequent micturition. Symptoms 1 year.
1892 (P)	16	Mrs. R.	Female.	35	Attacks of pain and frequent micturition. Hæmaturia for 7 years. Pain in right side and occasionally in left.
1892 (P)	17	Mrs. N.	Female.	25	Pain for 2 months and suppression of urine from left kidney. In November, 1891, a calculus was removed from the right (pyonephrotic) kidney by another surgeon. A large abscess followed, and this was succeeded by a sinus. The urine from right kidney was discharged through the loin by the old nephrotomy sinus.
1893 (P)	18	W. W.	Male.	13	Pain in right side for 7 years. Albuminuria and occasional hæmaturia.
1893 (P)	19	Mrs. F.	Female.	35	Pain and tenderness in right renal region for 4 or 5 months. Pain on micturition, necessitating a vesico-vaginal fistula for 10 years.
1893 (P)	20	Mr. Y.	Male.	38	Had been operated upon in February, 1893, for a perinephric abscess on left side. This re-formed and was opened on June 10, 1893. A sinus followed. In November, 1892, and at both the above-named dates, there was marked anuria.

Date of Operation.	Result.	Remarks.
ı. 3rd, 1892, L. Kidney.	Recovered.	Incision into convex border of kidney. No sinus. Wt. of calculus, 18 grains.
y 13th, 1892, R. Kidney.	Recovered.	Calculus weighed 362 grains. No sinus.
c. 24th, 1892, L. Kidney.	Recovered.	Left kidney drawn on to loin and incised in three places. Twenty-two phosphatic calculi were removed. Wt. of calculi, 96 grains. An abscess followed, but on January 9th wound closed and was never afterwards reopened. All attempts to close sinus on right side followed by severe symptoms, requiring sinus to be reopened. A cannula was therefore at length permanently maintained on the right side. (*V.* Table II., Nos. 13 and 14.)
y 13th, 1893, R. Kidney.	Recovered.	Tuberculated heart-shaped stone removed from pelvis of kidney. Wt. 33 grains. No sinus.
y 14th, 1893, R. Kidney.	Recovered.	A small lozenge-shaped uric-acid calculus removed. No sinus. After operation, all painful micturition disappeared, and vesico-vaginal fistula was closed by operation. Wt. of calculus, 4 grains.
ne 29th, 1893, L. Kidney.	Recovered.	Three calculi removed. The kidney was small and somewhat hydronephrotic. In this case an abdominal incision was made as well as the lumbar. Only a few ounces of urine passed by urethra till operation wound began to close. On July 11th 11 ounces were voided naturally, and from this time the quantity gradually increased. Wt. of calculi, 17 grains. No sinus remained.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1893	21	J. A.	Male.	21	Pain in right loin for 1 year. Hæmaturia, albuminuria, and pyuria.
1894 (P)	22	Mrs. B.	Female.	35	Lumbar pain on left side. Pyuria with very high temperature, and nervous agitation. Hard irregular swelling in right loin, to which no symptoms had been referred, and which was not known by patient to exist.
1894 (P)	23	L. W.	Male.	49	Previous passage of many calculi—the first 20 years ago, the last in January, 1894. Pain in left loin. Pyuria and hæmaturia, and also ova of Bilharzia hæmatobia.
1894	24	A. C.	Female.	22	Pain and resistance in right loin for 1 year. Albuminuria, pyuria, and hæmaturia. Oxalic and uric acid crystals.
1895	25	G. P.	Male.	30	Pain in right loin for 4 years. Hæmaturia and albuminuria. Oxalate of lime crystals.
1895	26	H. G.	Male.	11	Pain in right loin. Hæmaturia and pyuria. Duration of symptoms 3 years.
1896	27	R. H.	Male.	20	Pain in left loin for 4 years. Occasional hæmaturia.
1896 (P)	28	Miss B.	Female.	18	Pain in left loin. Hæmaturia. Symptoms since twelfth year of age.

Date of Operation.	Result.	Remarks.
Sep. 27th, 1893, R. Kidney.	Recovered.	Incision made into the organ and a stone extracted. Wt. of calculus, 40 grains. No sinus remained.
May 17th, 1894 (1st op.), R. Kidney.	Recovered.	A large calculus removed, weighing 830 grains, which was closely enveloped by the dilated pelvis and upper end of ureter. Urinary sinus persisted. Subsequently nephrotomy was performed on both kidneys. (*V.* Table II., Nos. 23 and 27.)
May 29th, 1894, L. Kidney.	Recovered.	An incision in the loin 9 inches long joined by a vertical incision 1½ inch long. Incision into convex border of kidney, and a uric-acid calculus, weighing 35½ grains, extracted from the lower fourth. No sinus.
Aug. 20th, 1894, R. Kidney.	Recovered.	Incision into convex border, and a calculus extracted weighing 5 grains. Incision in kidney closed with catgut sutures. No sinus.
Jan. 2nd, 1895, R. Kidney.	Recovered.	Incision into pelvis and ureter. Stone impacted at entrance of ureter; removed through incision in renal pelvis. No sutures. No sinus. Wt. of calculus, 6 grains.
Oct. 11th, 1895, R. Kidney.	Recovered.	Incision into pelvis of kidney, which was closed by silk sutures. Stone size of small plum-stone extracted. No sinus. Wt. of calculus, 8 grns.
Mar. 3rd, 1896, L. Kidney.	Recovered.	Incision into pelvis of kidney. Stone size of hazel nut extracted. No sinus. Wt. of calculus, 25 grains.
Mar. 15th, 1896, L. Kidney.	Recovered.	Calculus removed through the front of the renal pelvis. The incision was sutured. No sinus. Wt. of calculus, 25 grains.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1896 (P)	29	Mr. M.	Male.	58	Pain in left loin. Hæmaturia. Periodic attacks every 6 months for 8 years. During last 2 years attacks much more frequent. For several weeks preceding operation hæmaturia constant.
1897	30	R. A.	Male.	48	Pain in right loin for 40 years. Albuminuria, pyuria, and oxalate crystals.
1897	31	M. H.	Female.	29	Pain in left loin for 16 years.
1897	32	L. F.	Female.	22	Pain and swelling in right loin for 6 months. Hæmaturia, pyuria, and albuminuria.
1897 (P)	33	Mr. L.	Male.	44	Repeated attacks of pain and tenderness on left side for 16 years. Occasional hæmaturia. An abiding aching aggravated by exercise. No pus; no crystals in urine.
1898	34	E. P.	Female.	26	Pains in left loin for 2 years. Repeated attacks of left renal colic, accompanied by temporary complete suppression of urine, which lasted for 2 or 3 days at a time. There was enlargement of right kidney, which was also believed to contain a stone, but to which no symptoms were referred. During attacks of pain a swelling is felt in left renal region.

Date of Operation.	Result.	Remarks.
g. 1st, 1896, L. Kidney.	Recovered.	Incision into posterior aspect of renal pelvis. Oxalate of lime calculus removed weighing 41 grains. No sutures were used for the pelvis. No sinus.
y 28th, 1897, R. Kidney.	Recovered.	Incision into the ant. aspect of kidney, and a stone removed from its lower part. No sinus. Wt. of calculus, 147 grains.
ly 28th, 1897, L. Kidney.	Recovered.	Incision into pelvis and a stone extracted. The renal wound was sutured with 4 fine catgut sutures. No sinus. Wt. of calculus, 35 grains.
v. 22nd, 1897, R. Kidney.	Recovered.	Incision into post. wall of pelvis, and a friable, irregularly shaped stone was removed. Wound in pelvis was sutured. No sinus. Wt. of calculus, 2 grains.
c. 18th, 1897, L. Kidney.	Recovered.	Calculus removed from upper end of ureter by an incision through post. surface of pelvis. No sutures used, as the tissue of renal pelvis was very soft. No sinus remained. Wt. of calculus, 17 grains.
ı. 26th, 1898, L. Kidney.	Recovered.	Kidney large and congested. An incision was made in the convex border, and through it a stone weighing 11 grains was extracted from the renal pelvis. Uninterrupted recovery. No sinus. To return for purpose of having right kidney explored. (*Postscript.*—A large calculus was removed from the right kidney in April, 1898. A good recovery without a fistula followed.)

TABLE II.—CASES OF

PERFORMED BY

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1886	1	P. B.	Female.	40	Typhoid fever, followed 2½ years after by an abscess, which 8 months later was opened. A sinus in right loin left. Later a swelling developed, with pain, hæmaturia, pyuria, and oxalate of lime crystals. Micturition every half hour.
1887 (P)	2	Mr. E.	Male.	36	Pain and tenderness on left side. Hæmaturia after exertion for 10 years past.
1887 (P)	3	Mr. D.	Male.	39	Pain and swelling in right loin. Pyuria and hæmaturia 12 or 14 years; symptoms getting much worse of late. Often sounded for stone in bladder.
1887 (P)	4	Mr. D.	Male.	39	Evidence of stone by probing previous nephrotomy wound.
1888	5	J. J.	Male.	64	Pain in right loin for 6 years. Hæmaturia and oxalate of lime crystals.
1889	6	M. W.	Female.	55	Pain, tenderness, and swelling in right loin. Pyuria and hæmaturia. Symptoms for 30 years.

OTOMY FOR STONE.

NRY MORRIS.

Date of Operation.	Result.	Remarks.
18th, 1886, R. Kidney. Large amount of pus and gritty phosphatic calculous material removed.	Died June 22nd, from suppression of urine. Both kidneys affected.	More than 200 small facetted calculi, and a pus-containing cyst, as well as interstitial nephritis, were found in the opposite kidney. Retroperitoneal inflammation extended across the spine from one kidney to the other. (*V. Trans. of Clin. Soc.*, Vol. 20, p. 106.)
22nd, 1887.	Recovered.	Kidney small and hydronephrotic. Angular calculus removed. Wt., 15 grains. No sinus.
2nd, 1887, R. Kidney.	Recovered.	Kidney pyonephrotic. Small oxalate calculus removed through renal parenchyma. Wt., 26 grains. (A second nephrotomy on same side was performed a month later, *v.* No. 4. Sinus, but not urinary, persisted for some years.)
3rd, 1887, R. Kidney.	Recovered.	Calcium phosphate calculus, weighing 360 grains, removed. Recovery with sinus. (For previous nephrotomy, *v.* No. 3.)
5th, 1888, R. Kidney.	Recovered from operation, but died on Dec. 22nd in a fit, with symptoms of apoplexy.	Extensive atheroma of cerebral arteries. Wt. of calculus, 71 grains.
29th, 1889, R. Kidney.	Recovered.	Several calculi removed. Total wt., 500 grains. No sinus.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1889	7	H. F. P.	Female.	20	Pain and tenderness in right lumbar region. Hæmaturia and pyuria. Frequency of micturition. Symptoms for 18 months. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 1066.)
1889 (P)	8	St. A.	Female.	47	Pain and perinephritic abscess on right side. Pyuria and hæmaturia for 4 years. Pyonephrosis for several months. Perinephritic abscess pointing over lower ribs. Profuse diarrhœa.
1889 (P)	9	Mrs. G.	Female.	48	Pain, tenderness, and enlargement of kidney on right side. Pyuria. Symptoms going on for 4 years.
1890 (P)	10	Mr. A.	Male.	45	Pain and tumour in right side. Pyuria. Symptoms for several years.
1891	11	W. T.	Male.	17	Pain and tenderness in right loin. Previous passage of a stone. Hæmaturia and pyuria. Symptoms for 10 years.
1892	12	W. O.	Male.	33	Pain and tenderness in right loin for 1 year. Pyuria.

Date of Operation.	Result.	Remarks.
y 27th, 1889, R. Kidney.	Recovered.	Two calculi and large amount of pus removed. Wt. of calculi, 3½ and 84 grains. In 1890 patient complained of pain in the *left* loin. Laparotomy was performed and both kidneys examined. No further disease found. Patient quite relieved of her symptoms. (*V.* Table 4, No. 16.)
g. 11th, 1889, R. Kidney.	Died Aug. 12th. Septicæmia before operation.	The patient was *in extremis*, and the operation was performed as a last possibility of saving her life. Tissue round kidney very dense and fibrous. Kidney contained a quantity of thick pus and a calculus weighing 30 grains. No P.M. Death 18 hours after operation.
y 8th, 1889, R. Kidney.	Recovered.	Cavity in kidney containing pus and large amount of soft phosphatic concretions weighing about 30 grains. Recovery with a sinus, which eventually closed.
c. 17th, 1890, R. Kidney.	Died Jan. 26th, 1891. Septicæmia after operation, due to pre-existing condition of kidney.	Kidney contained a number of abscesses and a calculus weighing 125 grains. Died with symptoms of septicæmia. External wound apparently aseptic.
c. 2nd, 1891, R. Kidney.	Died Dec. 4th. Calculous disease of opposite kidney.	Incision into convex border of kidney. Three small calculi and a large amount of pus found. Passed very little urine after operation, and after death the *left* kidney was found to be extensively diseased with a stone impacted in the ureter. Wt. of calculi, 40 grains.
r. 22nd, 1892, R. Kidney.	Recovered.	Kidney purulent, with 2 calculi weighing 57½ grains. Recovered with a temporary sinus.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1892 (P)	13	Mrs. N.	Female.	25	An abscess following a nephrotomy for calculus done by another surgeon in November, 1891.
1892 (P)	14	Mrs. N.	Female.	25	Nephrotomy for abscess following previous nephrotomy for calculus.
1892	15	C. C.	Female.	36	Previous passage of 2 stones. Pain in both loins, chiefly left. Pyuria, hæmaturia, and albuminuria. Swelling in left loin. Symptoms for 2 years.
1892	16	J. M.	Male.	45	Discharging sinus in left loin, following perinephritic abscess in 1889-90. An injury from falling with his left loin against a cask in 1862 was succeeded by intermittent hæmaturia extending over a period of 1 year.
1893	17	E. R.	Female.	35	Pain and movable tumour in right loin. Albuminuria, hæmaturia, and pyuria. Symptoms for 15 years.
1893	18	T. R.	Male.	53	Pain and swelling in right loin. Hæmaturia and pyuria. Symptoms (pain and hæmaturia) off and on for 40 years. Tumour in side for 12 months.

Date of Operation.	Result.	Remarks.
ſ 5th, 1892, R. Kidney.	Recovered.	A third nephrotomy was performed on right kidney on Sep. 8th. Pus and phosphatic grit removed. (*V.* Table II., No. 14.)
. 8th, 1892, R. Kidney.	Recovered.	This was the third nephrotomy on right kidney. Pus and phosphatic grit removed. (For second, *v.* Table II., No. 13.) Subsequent nephrolithotomy on *left* kidney. (*V.* Nephrolithotomy, *v.* Table I., No. 17.)
y 5th, 1892, L. Kidney.	Recovered.	Large quantity of pus evacuated. Calculi weighing 534 grains. Recovered with a small sinus, which subsequently healed.
ʒ. 8th, 1892, L. Kidney.	Recovered.	Sinus explored, and a calculus found just outside the kidney substance. Wt. of calculus, 3 grains. The sinus eventually completely healed for a time, and he remained quite well till a fresh abscess, followed by a sinus, occurred, and he returned for further treatment in June, 1895. (*V.* Table II., No. 26.)
). 10th, 1893, R. Kidney.	Died Feb. 11th, from uræmia. Atrophy of left kidney also.	The kidney was loculated. Four calculi removed: 2 small and another large calculus from kidney substance, and 1, size of marble, from pelvis. Wt. of calculi, 208 grains. Only a few ounces of urine were passed. P.M., no injury to peritoneum. Left kidney anæmic, small. Renal substance of right kidney largely atrophied; strong fibrous septa between calyces.
). 14th, 1893, R. Kidney.	Recovered.	There were 2 large cystic swellings in the kidney. Three stones were extracted: 1 from the pelvis. 90 oz. of fluid came from the cysts Recovery without a sinus Wt. of calculi, 208 grains.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1893 (P)	19	Mrs. C.	Female.	63	Attacks of pain in right loin, accompanied by suppression of urine, for three months. Suppression of urine for 5 days before operation. Two years ago passed a stone, but it was not known from which kidney. Asthma and bronchitis at time of operation.
1894 (P)	20	Mr. W.	Male.	61	Nephrotomy on account of fistula following a perinephritic abscess opened 7 months before. Much pus in urine.
1894 (P)	21	W. C.	Male.	33	Pain chiefly in right side and passage of calculi. Hæmaturia and pyuria. Duration of symptoms 4 years.
1894 (P)	22	Mrs. P.	Female.	23	Pain in right lumbar region and pyuria for four years. Two months ago, pain and rigors. A large, movable, smooth tumour in right renal region.
1894 (P)	23	Mrs. B.	Female.	35	Troublesome sinus on right kidney and suspicion of stone in ureter. Nephrolithotomy had been performed on this kidney in May, 1894.

Date of Operation.	Result.	Remarks.
Oct. 6th, 1893, R. Kidney.	Died Oct. 6th, 1893, of anuria and bronchitis.	Incision into convex border of kidney. One calculus and several phosphatic concretions in pelvis and upper end of ureter. Died an hour after operation. Wt. of calculus, 18 grains.
Aug. 4th, 1894, R. Kidney.	Died Aug. 6th, 1894, of anuria.	Pus and calculus removed; one calculus and several small pieces. Perinephritic tissue very dense and bound to kidney. Death from suppression of urine. Wt. of calculi, 36 grains.
Aug. 21st, 1894, R. Kidney.	Died Aug. 23rd, 1894, from cerebral thrombosis occurring during anæsthesia.	Five calculi removed. The largest was wedged in the pelvis. Wt., 177 grains. When effects of anæsthetic had passed off he was found to be aphasic and hemiplegic on right side. P.M., extensive thrombosis of left middle cerebral. Fatty and dilated heart. Stones in left kidney.
Dec. 12th, 1894, R. Kidney.	Recovered.	Kidney sacculated and contained pus. A calculus was extracted from the pelvis through an incision in the convex border of the kidney. Recovered without a sinus. Wt. of calculus, 13 grains.
Nov. 28th, 1894 (2nd op.), R. Kidney.	Recovered.	Two small calculi removed from upper end of right ureter. Wt. of calculi, 10 grains. After this operation, the symptoms made it probable that the *left* kidney was not excreting any urine. The left kidney was subsequently operated on—*v.* Table II., No. 27. (For first operation in the right kidney, *v.* Table I., No. 24.)

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1894	24	E. J. B.	Male.	34	Stones removed from bladder in 1872 when 12 years of age, and others since have passed through the perineal fistula, which followed lithotomy. Pain, tenderness, and resistance in left loin. Pyuria, albuminuria, and hæmaturia. Symptoms for 26 years, commencing when 8 years old, continuous for last two years.
1895	25	H. W.	Male.	28	Pain and tenderness and swelling in right loin for 5 weeks. Hæmaturia, pyuria, and albuminuria. Pain in left loin for years. Stones removed from *left* kidney at St. Thomas's Hospital 2½ years ago.
1895	26	J. M.	Male.	47	Two sinuses in left loin. Previous nephrotomy for calculus in 1892. Pyuria and albuminuria. Formerly injury to left loin, followed by hæmaturia.
1895 (P)	27	Mrs. B.	Female.	35	Incomplete and intermittent suppression for 18 days. Complete suppression of urine for 4 days and tumour in left loin. Great collapse.

Date of Operation.	Result.	Remarks.
b. 20th, 1894, L. Kidney.	Recovered.	Several ounces of foul greenish pus in sacculated kidney. Uric-acid stone, weighing 19 grains, found in orifice of ureter. Incision into ant. aspect of kidney and pus and calculus removed. Recovery with a sinus. (For subsequent nephrectomy, *v.* Table III., No. 10.)
r. 1st, 1895, R. Kidney.	Recovered.	Incision into ant. aspect of kidney. Kidney contained pus, and a uric-acid stone with some phosphatic deposit was found in pelvis. Discharged with a small sinus, which was gradually diminishing. Wt. of calculus, 132 grains.
ne 25th, 1895, a lumbar sinus laid open. ne 28th, 1895, examination of kidneys by laparotomy.	Died June 28th. Both kidneys diseased.	Sinus explored on June 25th, but as the tissues were very dense, the kidney could not be distinguished. Severe pain continuing, and urine being almost suppressed, laparotomy was performed and both kidneys examined on June 28th, but no stone felt. P.M., left calculous pyelitis, with branched calculi within, with complete destruction of kidney substance and 2 fistulous openings between left renal pelvis and descending colon. Chronic nephritis of right kidney. (See Table II., No. 16.)
). 8th, 1895 (3rd op.), L. Kidney.	Died Feb. 8th, 1895, from anuria. Both kidneys extensively disorganised by calculi.	The patient was in a very collapsed condition, and the operation was performed as the only remaining chance of prolonging life. Large quantity of fœtid pus. Stone impacted in orifice of ureter, and another large branched calculus at upper end of kidney. Death 2 hours after operation. Wt. of calculus, 224 grains. (For previous operations on right kidney, *v.* Table I., No. 24; Table II., No. 23.)

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1895 (P)	28	L. C.	Male.	50	Pain and large tumour in left loin. Profuse pyuria. Ill many years, and desperately ill on arrival in London. Had been advised throughout by London physician against any operation, but now compelled, as he "can't go on any longer."
1895 (P)	29	C. C.	Male.	38	Intermittent pain in right kidney for many years. Many calculi passed, and the right kidney was several times blocked. Distinct tumour.
1895 (P)	30	G. H.	Male.	49	Occasional pyuria with left-sided "lump" since 1878, both persistent since 1894. Pain in left loin. High temperature. Pyuria ceased and lump increased during last 3 weeks. Renal calculus diagnosed in 1882. Syphilitic hemiplegia 4 years ago.
1896 (P)	31	W. H.	Male.	56	Pyuria since 1870. Repeatedly treated for cystitis. Hæmaturia after exercise in 1893. Since 1894 pain and swelling in right loin.
1896 (P)	32	Capt. M.	Male.	45	A history for many years of calculus. Rapid enlargement of right kidney after a day's hunting on a restive horse.
1896	33	D. I.	Male.	28	Pain in right loin for 12 years. Hæmaturia, pyuria, and albuminuria.

Date of Operation.	Result.	Remarks.
Aug. 1st, 1895, L. Kidney.	Died Aug. 5th, from exhaustion and uræmia.	A calculus removed weighing 248 grains. The kidney contained quantities of very offensive pus. Symptoms of uræmia supervened, with discharge of moderate quantity of highly albuminous urine, and patient died. No P.M.
Feb. 6th, 1895, R. Kidney.	Recovered.	Kidney in advanced state of pyonephrosis. One very large calculus and 3 small ones, welded together by phosphatic material, were removed. Recovery without a sinus. Wt. of calculi, 920 grains.
Nov. 2nd, 1895 (1st op.), L. Kidney.	Recovered, but sinus continued.	Kidney large and contained pus. Calculus removed weighing 122 grains. (Subsequent nephrectomy, *v.* Table III., No. 12.)
Nov. 20th, 1896, R. Kidney.	Recovered.	Large stone extracted weighing 591 grains. Kidney substance contained a large amount of very thick cheesy pus. Recovered without a sinus.
Feb. 21st, 1896, R. Kidney.	Recovered.	Kidney full of blood. Stone weighing 260 grains tightly impacted in lower part of pelvis. Kidney very hydronephrotic. Recovered without a fistula; subsequently a small superficial sinus followed a fresh intra-renal hæmorrhage, induced by heavy gun practice on board ship.
Nov. 20th, 1896, R. Kidney.	Recovered.	Stone in kidney substance close to hilum, weighing 591 grains. Kidney contained pus. No sinus.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1896 (P)	34	Mrs. O.	Female.	47	Pain in right renal region. Hæmaturia first when 24 years old after riding. Frequent micturition. Pyuria and albuminuria since 14 years ago. Has been frequently treated for cystitis.
1896 (P)	35	S. S.	Male.	21	Intermittent pain in left side. Hæmaturia. Pyuria. Symptoms of 5 to 6 years' duration. No tumour.
1896	36	F. C.	Male.	37	Renal abscess opened at St. Peter's Hosp. in 1894; and right kidney explored there in 1895, but no stone found. In 1896, six small stones were passed. Albuminuria and pyuria.
1897 (P)	37	Mr. J.	Male.	41	Pains and signs of calculus on right side for 11 years. Operation for pyonephrosis by another surgeon in 1895. Two sinuses communicated with the kidney: one between 8th and 9th ribs, and the other in ilio-costal space—the site of the former operation.
1897	38	F. I.	Male.	31	Pain and swelling in right loin. Hæmaturia and pyuria. Occasional slight attacks of pain for 12 years.
1897	39	A. M.	Female.	35	Pain and swelling in left loin for 18 months. Pyuria, hæmaturia, and albuminuria.

Date of Operation.	Result.	Remarks.
Dec. 2nd, 1896, R. Kidney.	Recovered.	A spiculated calculus, size of a small marble, was removed from pelvis. Incision into post. aspect of pelvis was closed by 3 Lembert's sutures. The kidney was sacculated. Recovery without a sinus. Wt. of calculus, 17 grains.
Dec. 14th, 1896, L. Kidney.	Recovered.	Seven calculi, occupying distinct sacculated recesses, were removed. Kidney small, with great loss of medullary substance. Recovery without a sinus. Wt. of calculi, 168 grains.
Dec. 2nd, 1896, R. Kidney.	Recovered.	Three stones were found. Recovery with sinus. This sinus has since quite closed. Wt. of calculus, 49 grains.
Jan. 17th, 1897, R. Kidney.	Recovered.	Fistula in loin laid open. Twelfth rib excised. One large calculus and 9 fragments the size of cherry stones were removed from two distinct recesses in the right kidney. Sinus in loin closed for a time, but subsequently reopened; that between the ribs still persisted. Wt. of calculi, 107 grains. Removal of parts of 9th, 10th, and 11th ribs, with view of getting sinus to close, on Feb. 18th. Result promising, but as yet undetermined. (*Note.*—August, 1898. The fistulæ have quite healed and the patient is cured.)
Feb. 8th, 1897, R. Kidney.	Recovered.	Incision into post. aspect of kidney near hilum. 3 calculi found, weighing 380 grains. No sinus. Kidney loculated and much degenerated.
Mar. 19th, 1897, L. Kidney.	Recovered.	Stone found in pelvis of kidney, weighing 141 grains. Kidney substance was much hollowed out. No sinus.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1897	40	W. R.	Male.	22	Pain in right side occasionally nearly all his life. Pyuria, hæmaturia, and albuminuria.
1897 (P)	41	Mrs. B.	Female.	47	Pain, swelling, and mobility of right kidney. Pyuria. From 3 to 4 years aching in right kidney. No hæmaturia throughout; but urine often thick and offensive.
1897	42	C. B.	Female.	26	Pain in right side for 3 months. Albuminuria, hæmaturia, and pyuria.
1897 (P)	43	Mr. H.	Male.	34	Perinephritic abscess on left side. Nephrolithotomy on kidney of same side in 1887.
1897	44	W. W.	Male.	31	A negative exploration was performed on March 26th, 1890, on account of pain and hæmaturia of one year's duration. In June, 1891, he passed a small stone. Remained quite well for 18 months, when intense pain and hæmaturia occurred. Three weeks before readmission he passed another stone.

Date of Operation.	Result.	Remarks.
Apr. 14th, 1897, R. Kidney.	Recovered.	Incision into ant. aspect of kidney. A stone removed from the kidney substance. Considerable hydronephrosis of the kidney. No sinus. Wt. of calculus 30½ grains.
Apr. 3rd, 1897, R. Kidney.	Recovered.	Kidney enlarged and pyonephrotic. Two calculi: 1 in pelvis and other in upper end of ureter. These calculi were in contact with each other, and had highly polished surfaces, and weighed 826 grains. Recovery without a sinus.
Oct. 13th, 1897, R. Kidney.	Recovered.	The kidney was cystic, and on being tapped, 4 oz. of purulent fluid escaped. Two stones were found in the calyces. No sinus. Wt. of calculi, 18 grains.
Oct. 24th, 1897, L. Kidney.	Recovered.	Kidney found to be much sacculated, and a large stone removed weighing 240 grains. (For previous nephrolithotomy *v.* Table I., No. 4, and for subsequent nephrectomy, *v.* Table III., No. 13.)
Dec. 6th, 1897, R. Kidney.	Recovered.	The kidney was hypertrophied and the pelvis very dilated. Incision into post. wall of pelvis allowed a considerable quantity of fluid to escape. A large calculus was found in the renal pelvis and removed through an incision in the pelvis; another calculus in the ureter about 4 inches down. The ureter was incised, stone extracted, and the incision in the ureter sutured. The wound in the pelvis was also sutured. No sinus. Wt. of calculi, 117 grains. (*V.* Table IV., No. 17.)

TABLE III.—CASES OF

PERFORMED BY

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1883	1	R. W.	Male.	35	Entirely disabled by pain and tenderness in right loin. Passage of stones. Hæmaturia and albuminuria.
1890	2	C. L.	Female.	44	Pain and large swelling in right loin. Pyuria. Symptoms for 10 years.
1890	3	L. A.	Male.	38	Pain for 6 years. Previous passage of 2 stones 2 years ago and 2 months ago respectively. Frequent micturition. Pain in both loins, chiefly in left. Pyuria.
1890	4	W. R.	Male.	30	Swelling and pain in right loin. Pyuria. Symptoms for 9 years. (*Brit. Med. Journ.*, Vol. 1, 1893, p. 4.)

ECTOMY FOR STONE.

ENRY MORRIS.

Date of Operation.	Result.	Remarks.
. 24th, 1883, R. Kidney.	Recovered.	Previous negative exploration in 1882. No sinus. Kidney quite healthy to naked eye, but for presence of stone. Wt. of calculus, about 20 grains. (See *Roy. Med.-Chir. Soc. Trans.*, 1885, Vol. 8, and Table IV., No. 2.)
y 16th, 1890, R. Kidney.	Recovered.	Kidney in advanced state of pyonephrosis. A large crumbling calculus extracted, weighing 557 grains. Recovery with a small sinus. (*Brit. Med. Journ.*, 1893, Vol. 1, p. 4.)
. 23rd, 1890, L. Kidney.	Died Oct. 25th. Interstitial nephritis of opposite kidney.	The left kidney weighed over 2⅛ ounces, and was in a state of chronic interstitial nephritis, and contained cysts filled with calculous material. Urine was freely passed after operation, and after feeling drowsy for a few hours, patient suddenly collapsed and died. P.M., wound healthy. No injury to peritoneum or surrounding structures. Uric-acid calculus impacted in left ureter 2 in. from bladder. Right kidney small. Interstitial nephritis. (*Brit. Med. Journ.*, 1892, Vol. 1, p. 1065; and *Brit. Med. Journ.*, 1893, Vol. 1, p. 4.)
r. 12th, 1890, R. Kidney.	Died Nov. 16th. Pyonephrosis and calculus in opposite kidney.	The kidney was converted into a pyonephrotic sac—with calculi weighing 441 grains. Urrne was freely passed after operation, but patient gradually sank and died. P.M., wound healthy. No injury to peritoneum or other structures. The *left* kidney was found to be in a very advanced state of pyonephrosis, and also contained calculi.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1890 (P)	5	Mrs. D.	Female.	26	Pain and tumour in loin. Pyuria.
1891	6	J. D.	Female.	23	Pain, tenderness, and swelling in left loin for 9 months. Pyuria and albuminuria.
1891	7	K. V.	Female.	23	Troublesome sinus and renal destruction from fresh calculus, after nephrolithotomy of right kidney.
1892	8	J. A.	Male.	47	Attacks of renal colic for 12 years. Pain and tumour in left loin. Hæmaturia and pyuria.
1893 (P)	9	A. T.	Male.	22	Aching in right loin. Attacks of pyrexia. Pyuria. Symptoms 3 to 4 years.
1894	10	E. J. B.	Male.	34	Pyonephrosis with persisting sinus after nephrotomy.
1894 (P)	11	Capt. E.	Male.	48	Very large tumour in right lumbar region. Symptoms of renal calculus when a boy. Attacks of pain, with hæmaturia, in 1877, 1880, 1885, and 1894.

Date of Operation.	Result.	Remarks.
April 26, 1890.	Recovered.	Three calculi were found, weighing 58½ grains. Kidney in advanced state of pyonephrosis. No sinus.
June 10th, 1891, L. Kidney.	Recovered.	The kidney substance contained 10 oz. of very offensive pus, and 2 calculi were found lying at the mouth of the ureter. Wt. of calculi, 23 grains.
July 25th, 1891, R. Kidney.	Recovered.	The kidney was in a state of pyonephrosis, and contained calculous concretions. Good recovery without a sinus. In this case nephrolithotomy had been previously performed on *both* kidneys. (For previous operations, *v.* Table I., Nos. 6 and 9; *Brit. Med. Journ.*, 1893, Vol. 1, p. 4.)
Aug. 29th, 1892, L. Kidney.	Recovered.	The kidney was extremely sacculated, and the ureter much dilated. No sinus.
Feb. 22nd, 1893, R. Kidney.	Recovered.	The right kidney was very small and strongly adherent to surrounding tissue. The organ was sacculated, and contained a small phosphatic calculus. Sinus for few months; ultimately quite healed.
Mar. 27th, 1894, L. Kidney.	Recovered.	(For previous nephrotomy, *v.* Table II., No. 24.)
Nov. 19th, 1894, R. Kidney.	Died Nov. 19th, from shock. Hopelessly ill at time of operation, which was done as giving the only chance.	Operation performed when patient was in extreme condition and supposed to be suffering from malignant disease of liver. Tumour, which simulated malignant disease, was first explored by laparotomy, and then exposed by incision through loin. 10 oz. of calculus and large amount of disorganised blood-clot removed from kidney. Hæmorrhage severe, so that nephrectomy was performed. Patient died 2½ hours after completion of operation.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1895 (P)	12	Mr. G. H.	Male.	49	Pyonephrosis and persistence of fistula after nephrotomy. Opposite kidney had been secreting well up to time of operation.
1897 (P)	13	Mr. H.	Male.	34	Persisting sinus after nephrotomy.
1897	14	E. B.	Female.	50	Acute pain in left loin. Pyuria. Attacks of pain for 20 years.
1897	15	F. R.	Male.	34	Pain and resistance in left loin. Hæmaturia and pyuria. Blood first noticed in urine when he was 9 years old.
1898 (P)	16	Mr. P.	Male.	51	Attacks of left-sided colic for 23 years with occasional hæmaturia — one serious attack lasting several weeks. Pyuria and, finally, a perinephritic abscess, which was opened Oct. 3rd, 1897, and followed by a sinus.

Date of Operation.	Result.	Remarks.
Dec. 19th, 1895, L. Kidney.	Died Dec. 22nd. Death from anuria.	Death due to suppression of urine. Previous nephrotomy for calculus. Had had syphilitic hemiplegia, and still had remains of gumma in calf of leg. (*V.* Table II., No. 30.)
Dec. 29th, 1897, L. Kidney.	Recovered.	Kidney found to be a mere shell. It was very firmly fixed to surrounding tissues. Wt. of calculus, 14 grains. (For two previous operations, *v.* Table I., No. 4, and Table II., No. 43.)
Feb. 5th, 1897, L. Kidney.	Recovered.	No sinus. The kidney was greatly altered, and its substance hollowed out. A small calculus was found firmly embedded in the wall of ureter, close to its commencement. This stone projected into the lumen, and the ureter was dilated above. A little below was a much smaller stone, also embedded in wall of ureter.
July 30th, 1897, L. Kidney.	Died Aug. 16th. Calculus almost certainly in opposite kidney, but no P.M. allowed.	The left kidney was in an advanced stage of pyonephrosis, and a calculus was found completely blocking the upper end of left ureter. After the nephrectomy, the urine still contained the same amount of pus and blood, thus conclusively showing that the remaining kidney was also the seat of pyonephrosis. No P.M. exam. could be obtained.
Feb. 3rd, 1898, L. Kidney.	Recovered from the effects of operation, and was convalescing well, when he expired suddenly on Feb. 17th from heart failure after receiving sudden alarming news. He had previously had severe attacks of syncope, and on some occasions, Dr. Chaffey, of Brighton, tells me, these attacks had been like angina.	The kidney was very sacculated, and its secreting substance almost destroyed, except a small portion in the inferior part. The kidney contained a large stone, weighing 172 grains.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1898	17	Mr. T. (P)	Male.	53	Occasional severe attacks of renal (left) colic with hæmaturia and pyuria, extending over several years. Calculi had been passed.
1898	18	M. L.	Male.	58	Attacks of pain in left loin 30 years ago which entirely passed off. In November, 1897, there was pain in left loin of a dull character, with very acute exacerbations. Tenderness in left loin, but no tumour. Urine contained albumen and pus, but no blood.

Date of Operation.	Result.	Remarks.
Feb. 14th, 1898, Nephrectomy, L. Kidney.	Recovered.	Stout thick-set man. A long, oblique, lumbar incision. The last rib had to be removed. Evidence of intense chronic perinephritis. Kidney greatly disorganised. Ureter patent but inflamed. No stone present at time of operation.
March 4th, 1898, Nephrectomy, L. Kidney.	Recovered.	The kidney, which was situated very high up under the lower ribs, was in an advanced stage of pyonephrosis, and contained a calculus weighing 228 grains.

TABLE IV.—EXPI

PERFORMED

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1882	1	J. G.	Male.	35	Symptoms over 11 years. Pus in urine. Pricking pain and tenderness in left loin
1882	2	R. W.	Male.	34	Paroxysmal pain in right loin for 10 months. Passed a calculus the size of a pea. (Referred to in *Brit. Med. Journ.*, Vol. 1, 1892, p. 1067.)
1885	3	A. F.	Female.	29	Pain and frequency of micturition for 6 years. Albuminuria, pyuria, and hæmaturia.
1886	4	E. S.	Male.	30	Occasional attacks of hæmaturia for 7 years. Frequency of micturition. Tenderness in left loin and some pyuria.
1886	5	G. M.	Male.	58	Was treated for renal calculus in 1874, and passed some stones. Pain in left loin. Pyuria and albuminuria. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 1009.)

ıTORY OPERATIONS.

MR. HENRY MORRIS.

Date of Operation.	Result.	Remarks.
Jan. 4th, 1882, L. Kidney.	Recovered.	No stone felt in kidney. Large trocar and cannula passed in at the convex border, but no fluid withdrawn. Wound healed without sinus. Kidney was movable on psoas. (See *Brit. Med. Journ.*, 1892, Vol. 1, p. 1009.) (For subsequent operation, *v.* No. 28.)
Nov. 8th, 1882, R. Kidney. Subsequent nephrectomy on Oct. 24th, 1883, when a stone was found embedded in the kidney.	Recovered, with relief.	The lower part of the kidney was very firm and hard to the touch, but exploration with finger and a needle failed to reveal a stone. Wound healed, and pain less than before operation. (See Table III., No. 1.)
July 25th, 1885, L. Kidney.	Recovered.	Kidney carefully felt with finger and probed in several places with negative result. Some hæmaturia persisted. No sinus.
Dec. 1st, 1886, L. Kidney.	Recovered.	Exploration of kidney with finger and needle. Negative result. No sinus. Prostatic abscess subsequently opened. Probably tuberculous. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 1009.)
April 14th, 1886, L. Kidney.	Recovered. No relief followed operation.	Kidney felt with finger and explored with probe. Patient died from other causes on June 19th. P.M.—Prostatic calculus, cystitis, commencing pyonephrosis on left side, and on the right the kidney was shrivelled and the ureter 3 inches from infundibulum was converted into a fibrous cord.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1887	6	Mr. S. (P)	Male.	63	Great pain in left hypochondriac region for 3 years. Pyuria. Rigors at intervals. Kidney very movable, and gave patient impression of something swinging "like a pendulum."
1888	7	Mr. C. (P)	Male.	56	Attacks of renal colic on left side since May, 1886. Pyuria since Oct., 1887. On Feb. 3rd, while on a long journey, was seized with great pain and alarming collapse, followed by anuria for 26 hours. (Referred to in *Brit. Med. Journ.*, Vol. 1, 1892, p. 1067, under "Undetected renal calculus.")
1888	8	C. W.	Male.	34	Paroxysmal pain in right loin, with pain and difficulty in micturition, with vomiting for 3 years. On one occasion hæmaturia. Oxalate of lime crystals in urine. For 5 months preceding operation pains had been much worse and shooting along the abdomen into testis.
1889	9	M. C.	Female.	51	Tenderness and pain in right loin, following injury to back 3 years before. Occasional hæmaturia and pyuria. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 1008.)

Date of Operation.	Result.	Remarks.
June 6th, 1887, L. Kidney.	Recovered. Symptoms not relieved.	The kidney was found to be somewhat movable, but otherwise nothing was found. More than a year afterwards the patient died, and at the P.M. a calculus was found in the bladder end of ureter; the prostate was riddled with abscesses, and both kidneys were the seat of suppuration. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 1065.)
Feb. 25th, 1888, L. Kidney.	Recovered.	The left kidney was found to be movable. The pelvis was palpated from the front. The renal cavity was pouched and dilated, but there was a considerable thickness of renal substance. Wound healed well. Pyuria continued for many months afterwards. Presumption a stone had passed, or was in vesical end of ureter, or in calyx of kidney.
Dec. 19th, 1888.	Recovered.	Kidney thoroughly explored with finger, a needle, and trocar and cannula. Kidney moved in "cinder-sifting" manner. A little puriform urine escaped through the cannula, but no stone could be felt. Nephropexy by author's method. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 1009.)
Mar. 4, 1889, R. Kidney.	Recovered.	Kidney palpated and punctured with exploring needle and trocar and cannula. Old perinephritis. The perinephritic tissue was very dense and matted together, giving the impression that the kidney was enlarged. Recovered without a sinus. Known to be well in 1892.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1889	10	A. B.	Male.	20	Dull aching pain in left loin for 9 months. Albuminuria, pyuria, and crystals of oxalate of lime. (Referred to in *Brit. Med. Journ.*, Vol. 1, p. 1067, under "No sufficient cause discovered.")
1889	11	Mr. A. (P)	Male.	21	Hæmaturia first in May, 1888, after sprain at lawn tennis, then at intervals up to March, 1889, when it became continuous. During an attack in 1888 the kidney swelled up, and was apparently blocked by blood-clot for a time. Urine examined for tubercle bacilli, but none found. Tuberculous family history. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 1007.)
1889	12	M. C.	Female.	51	Injury to back in 1886, when carrying a water-bucket. Since then has had occasional pain in back, especially on right side. Small amount of blood in urine.
1890	13	Mr. F. (P)	Male.	37	Symptoms of renal calculus. Oxaluria, for which he had been treated for 6 months. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 1065.)
1890	14	Mr. B. (P)	Male.	35	Pains in region of right kidney, coming on whilst roughing it in diamond fields in Africa. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 1008.)

Date of Operation.	Result.	Remarks.
Aug. 29th, 1889, L. Kidney.	Recovered.	Negative exploration of left kidney. Wound healed. After leaving, an abscess developed in the *right* loin, and a tubercular deposit formed in the epididymis. No sinus. Probably tuberculous.
May 3rd, 1889, L. Kidney.	Recovered.	The kidney was freely punctured, but not incised. *Old perinephritis.* The perinephritic tissue was very adherent, and the upper part of the kidney was harder than normal. Possibly due to old injury. Hæmaturia occurred during convalescence, and also at intervals for a short time afterwards, and then ceased altogether. No sinus. He has been well since, is married, and leads an active life. Was seen in 1897.
March 4th, 1889, R. Kidney.	Recovered.	Kidney small and closely matted to adjacent tissue. Explored with finger, needle, and trocar and cannula, but no stone or pus found. *Old perinephritis.* No sinus. (*V. Brit. Med. Journ.*, Vol. 1 1892, p. 1008.)
April 30th, 1890, R. Kidney	Recovered.	Kidney moved in "cinder-sifting" manner. The convex border of the kidney was incised and the organ explored. A sacculated calyx, covered with only a thin layer of renal tissue in upper part of organ, was found. The incision in the kidney was sutured. Two calculi, which must have been in the ureter, were passed during convalescence.
Aug. 26th, 1890, R. Kidney.	Recovered.	The kidney was explored and punctured, but not incised. *Old perinephritis.* The perinephritic tissue was dense and very adherent to the kidney. The wound healed, but after hard exercise (shooting in Scotland) an abscess formed and was opened on Nov. 6th. It soon healed, and he left Southampton on Nov. 28th, 1890. Has kept well since, and led a very active life in South Africa.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1890	15	Mr. W. (P)	Male.	35	Came from India with symptoms of stone. Attacks of colic. Increasing left-sided pain for 1 year. Passed a stone 4 months ago.
1890	16	H. F. P.	Female.	21	Pyuria. Previous nephrotomy and extraction of calculi from right kidney on July 27th, 1889. After this operation there was pain in *left* loin, and some calculi were passed on different occasions. On October 23rd, 5 smooth and oval stones were voided, weighing together 4 grains.
1890	17	W. W.	Male.	24	Aching pain in the right loin for 12 months. Occasional hæmaturia. (Referred to in *Brit. Med. Journ.*, 1892, Vol. 1, p. 1067, under: "No sufficient cause discovered.")
1890	18	F. W. B.	Male.	29	After recovery from peritonitis in February, 1890, pain in right loin for 5 months, paroxysmal in character. A movable swelling could be felt below right costal margin.

Date of Operation.	Result.	Remarks.
April 27th, 1890, R. Kidney.	Recovered from operation, but died almost suddenly from hæmorrhage due to gastric ulcer about one month afterwards.	The right kidney was incised along convex border and freely explored. Nothing was found, and it was sutured. Wound healed. On May 24th patient died after profuse hæmatemesis, and at P.M. examination an ulcer of the stomach was found almost perforating. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 897.)
Jan. 17th, 1890. Exploration through an abdominal incision.	Recovered.	The right kidney, which had been previously operated upon, was rather soft and flabby at its upper end, but otherwise normal. The left was of very soft consistence. In 1894 was living and well, and had given birth to one child. (For previous nephrotomy, *v.* Table II., No. 7. *Brit. Med. Journ.*, 1892, Vol. 1, p. 1066.)
Mar. 26th, 1890, R. Kidney.	Recovered.	Kidney incised and finger passed into renal pelvis; calyces dilated, but no stone found. Wound healed without a sinus. In June, 1891, and again in November, 1897, a stone was passed. Nephrotomy and ureterotomy for calculus performed in December, 1897. (*V.* Table II., No. 44.)
June 18th, 1890, R. Kidney.	Recovered from operation, but not much if at all relieved.	The kidney was exposed and brought up into the wound, and seen to have several white tuberculous deposits in its substance. No stone. Recovered with some improvement, and was discharged with wound quite healed; but shortly after an abscess, and then a fæcal fistula, formed in right iliac fossa, which was subsequently found to be communicating with the cæcum. Probable primary seat of disease was tuberculosis of cæcum or appendix. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 898.)

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1891	19	B. F.	Female.	33	Pain in right loin of 18 months' duration. Pain sometimes extremely severe, entirely disabling her. Retention of urine for 3 weeks before admission. Pyuria, hæmaturia, and oxalate crystals. Employed at swimming baths, and had probably had strains in back. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 1008.)
1891	20	G. L.	Female.	37	Paroxysmal pain in left side and vomiting. Frequency of micturition and occasional hæmaturia. Pyuria and oxalate of lime crystals in urine. Pieces of mortar-like stone had been passed. Bladder twice examined with negative results. (*V. Brit. Med. Journ.*, 1892, Vol. 1, p. 1067.)
1891	21	Mr. D. (P)	Male.	40	Symptoms of renal calculus for 14 years. For many months previous to operation had suffered so much he could scarcely attend to his business. Passed piece of calculus in 1878, and two months later a second piece.
1892	22	P. J.	Male.	35	Frequent very severe attacks of hæmaturia, with great pain on right side since 1886. Frequency of micturition. Large quantity of pus in urine.

Date of Operation.	Result.	Remarks.
April 1st, 1891, R. Kidney.	Recovered.	A puckered scar was found in lower and outer border of kidney and evidence of old perinephritis, the result probably of injury. Incision into convex border and exploration of hilum revealed nothing. Renal wound was closed by fine catgut sutures, and healed without a sinus. Wound healed rapidly, and she was discharged on May 4th convalescent and free from pain. Heard of since as keeping well.
May 23rd, 1891, L. Kidney. Hæmorrhoids and rectal polypus removed 5 weeks later.	Recovered.	No stone felt, but there was a small hard lump near upper and posterior border, which proved to be a retention cyst. An incision was made into the convex border, but no stone felt. The wound in the kidney was closed with catgut sutures, and healed without a sinus. Was seen quite well in June, 1892.
July 18th, 1891.	Recovered.	Convex border of kidney incised and digitally explored; sutured. Kidney small, renal pelvis sacculated. Perinephritic tissue dense and matted to kidney, and was separated with difficulty. No stone found. Quite recovered. No sinus. Heard of at intervals since as keeping quite well. (*Brit. Med. Journ.*, 1892, Vol. 1, p. 1066.)
May 23rd, 1892, R. Kidney.	Recovered from operation, but died June 13th from tuberculous disease of both lungs and left kidney.	Kidney large and lobulated. Incision made in convex border, but no stone found. Patient was much troubled with hiccough, and before death had several attacks of hæmatemesis. Lungs riddled with recent grey granulations. Traces of old tuberculous disease in both. Also in right epididymis and cord. Left kidney a multilocular cyst with caseous contents. Left ureter full of tuberculous material. (P.M. Report, p. 327; Surg. Report, 1892.)

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1893	23	Mrs. S.	Female. (P)	66	Occasional pain and tenderness in left kidney following a strain. General indisposition and occasionally some marked pyrexia. Much psychical disturbance both before and after operation.
1894	24	C. K.	Female.	11	Pain in right loin and also during micturition for 3 months. A few pus cells in urine and some oxalate crystals. Incontinence of urine.
1894	25	L. B.	Female.	47	Nephrorrhaphy on right side in 1892 by provincial surgeon; but kidney becoming loose again, a second fixation operation was performed by Mr. Morris on Dec. 5, 1893. Return of pain and nausea, especially after exertion, in April, 1894. Uric-acid crystals in urine.
1894	26	W. F.	Male.	31	Previous exploration through left linea semilunaris of left kidney by a colonial surgeon. Dragging pain in left loin. Swelling in left loin and passage of a stone. Oxalate crystals in urine.
1894	27	E. S.	Female.	38	Pain on micturition and in back for some months, more marked on right side. Pus and albumen occasionally present in urine.

Date of Operation.	Result.	Remarks.
Oct. 15th, 1893, L. Kidney.	Recovered.	The kidney was exposed, and on dividing the capsule, two or three teaspoonsful of fluid blood escaped. "Subcapsular hæmorrhage." Complete subsequent recovery.
Feb. 20th, 1894. Right K.	Recovered. Urine still contained pus and oxalate of lime crystals.	R. kidney brought to surface through a lumbar incision. Incision along convex border and pelvis digitally explored. Renal wound closed with catgut sutures. Wound healed by first intention, and patient discharged on March 30, 1894.
June 23rd, 1894. Exploratory laparotomy followed by incision into R. loin.	Died June 25th. Gastric ulcer almost perforating in posterior surface of small curvature 3 inches from pylorus.	Kidney was very firmly fixed to surrounding structure. Incision was made into cortex and finger introduced into pelvis, but no stone felt. After operation there was most obstinate vomiting and some hæmatemesis. P.M. A gastric ulcer was found. Kidneys showed fibroid changes. Wounds healthy, no peritonitis. (For previous operation, *v.* Table V., No. 20.)
Nov. 14th, 1894, L. Kidney.	Recovered.	Exploratory incision. No abnormality found. Kidney, firm and apparently healthy, was not incised. Discharged free from pain; no sinus. Seen March 5, 1898. Had been quite well through rough life in S. Africa since operation.
Nov. 15th, 1894, R. Kidney.	Recovered. Pain relieved, but albumen and pus still in urine.	Incision made into convex border of kidney. Exploration by finger failed to discover anything abnormal. Renal incision closed with 3 catgut sutures. Recovered without a sinus.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1894	28	J. G.	Male.	46	Pain in left loin dating since 1871. Negative exploration of left kidney in 1882, when kidney was found somewhat movable. Pain in left loin again returned.
1894	29	W. F. S.	Male.	47	Pain in 1881 in loins; shortly after passed a stone. Others passed in 1883 and subsequently. Pain in back since, worse on left side. During 1894 several severe attacks of left-sided colic. Urine alkaline, triple phosphate and oxalate crystals and pus.
1895	30	J. M.	Male.	20	Pain in loins chiefly on right side. Severe attacks of hæmaturia. Symptoms for 6 months.
1896	31	M. P.	Female.	27	Pain in loins, chiefly left. Occasional hæmaturia, albuminuria.
1896	32	E. H.	Female.	22	Pain in both loins, but mostly in the left. Duration 5 months. Occasional hæmaturia.

Date of Operation.	Result.	Remarks.
May 1st, 1894, L. Kidney.	Recovered.	Kidney exposed, and scar along convex border from former puncture was found to be firm and slightly puckered. An incision was made into kidney through the scar, and the pelvis explored with the finger, but no stone found. Patient discharged with a small sinus, which healed soon after. (For 1st operation, *v.* No. 1.) 1898. Seen at short intervals up to present time. Often passes large quantities of urates and occasionally albumen. Has grown very stout.
Oct. 13th, 1894, L. Kidney.	Recovery with loss of all pain.	Kidney explored through loin. Incision in convex border and finger passed into renal pelvis. No stone; but in lower part of kidney a large sacculus communicated with the renal cavity. Renal wound closed by sutures. Parietal wound healed rapidly and completely. Was free from pain after operation.
Feb. 2nd, 1895, R. Kidney.	Subsequent nephrectomy and death from continuance of hæmaturia and hæmorrhage from wound.	Incision made into post. border of kidney, and the organ explored with finger, but no stone found. The cortex was sutured. Subsequently nephrectomy was performed on account of continuing hæmaturia. (*V.* Table VIII., No. 3.)
Nov. 11th, 1896, L. Kidney.	Recovered.	Incision made into kidney, but nothing found. Wound healed well.
Dec. 14th, 1896, L. Kidney.	Recovered.	Extravasation of blood found under capsule. "Subcapsular hæmorrhage." Kidney incised and explored, but no stone felt. Wound completely healed.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1896	33	G. B.	Male.	21	Pain in the right loin for 3 years. Pus occasionally in the urine.
1896	34	C. E.	Male.	34	Dull aching pain in right loin for a few months. Urine often thick.
1896	35	G. C.	Male.	34	Paroxysmal acute attacks of pain in right loin, with occasional hæmaturia.
1897	36	Mr. W. (P)	Male.	29	Passed a calculus 8 years before. Later on he had frequency of micturition and the bladder was examined. Pain in left loin and some enlargement of left lobe of prostate.
1897	37	H. F.	Male.	24	Attacks of pain in left loin for two years. Urine sometimes very dark. Tenderness and sense of resistance in left loin. Albuminuria.
1897	38	J. K.	Male.	42	Hæmaturia in July, 1896, after straining his side. Some indefinite swelling and pain in left loin occurred 6 months later and continued, as did also the hæmaturia.

Date of Operation.	Result.	Remarks.
Mar. 5th, 1896, R. Kidney.	Recovered.	Incision made into convex border of kidney and finger introduced, but no stone felt. The renal incision was closed with 5 gut sutures. Wound healed well.
March 25th, 1896, R. Kidney.	Recovered.	Kidney palpated, finger introduced through an incision in its outer border, but no stone felt. Wound closed with sutures. Wound healed completely, and the pain was relieved.
April 28th, 1896, R. Kidney.	Recovered.	The kidney was explored by the finger through an incision along the convex border. Patient discharged with wound healed.
July 11th, 1897, L. Kidney.	Recovered.	The kidney was exposed and incised, but found to be quite healthy; sutured. The bladder was also sounded and cystoscoped and prostate examined under anæsthesia. Wound healed well. Pain was relieved, but some vesical irritability still remained. Small prostatic calculus suspected. Tubercle bacilli had been frequently searched for in urine, but none found.
March 18th, 1897, L. Kidney.	Recovered.	Kidney examined digitally through an incision in its convex border, but nothing found. The kidney wound was sutured. Wound healed, and patient left with less pain than before.
April 7th, 1897, L. Kidney.	Recovered, but pain soon returned.	On exposing the kidney a small stone was thought to be felt in the pelvis. In separating the kidney the cortical substance, which was very thin, gave way, and a large quantity of altered blood-clot came from the interior of the kidney. "Intrarenal hæmatoma." On introducing the finger no stone could be felt: *v.* No. 39.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1897	39	J. K.	Male.	42	L. kidney previously explored. Persistence of pain and occasional severe hæmaturia.
1897	40	L. V.	Female.	18	Frequent attacks of pain in left loin, which radiate down the left leg. Sometimes pain in micturition.
1897	41	M. P.	Female.	45	Frequency of micturition for 2 years, followed by pain on micturition, and some abdominal pain. Slight amount of pus and blood in urine, and some oxalate crystals. Bladder explored, and catheterisation of ureters showed pus to come from the left.
1897	42	E. M.	Female.	39	Aching pain in back, especially on right side, for some years. Urine has occasionally contained pus and blood.

Date of Operation.	Result	Remarks.
Nov. 22nd, 1897, L. Kidney.	Recovered.	The incision was made through the old scar, and after a prolonged search the kidney was found to be represented by a flattened mass of fibrous tissue. The ureter was very much atrophied throughout. Thus the kidney had completely atrophied between April 7th and Nov. 22nd of the same year. Quite relieved of pain, but hæmaturia continues, and the man is getting gradually weaker. He died in June, 1898, from retro-peritoneal carcinoma and secondary deposits in the liver. (For previous explor., *v.* No. 38.)
June 9th, 1897, L. Kidney.	Recovered	The kidney appeared to be normal, and an incision into its substance revealed nothing abnormal. The kidney substance was sutured, and wound healed well. Left hospital quite relieved.
July 7th, 1897, L. Kidney.	Recovered. Symptoms have since returned.	Partial excision. The kidney was found to be somewhat granular and contracted. An incision showed that the cortex was atrophied. *An abscess in the parenchyma was opened and scraped.* No stone found. Kidney wound closed with 4 sutures. Wound healed well.
July 30th, 1897, R. Kidney.	Recovered.	Nothing abnormal found. The kidney was explored by an incision into its substance, which was afterwards closed by 4 silk sutures. Wound healed well.

TABLE V.—OPERATIONS

PERFORMED BY

YEAR.	NO.	INITIALS.	SEX.	AGE.	LEADING SYMPTOMS.
1886	1	J. M.	Female.	41	Severe fall when 11 years old, and afterwards always had occasional pains in right side, which became worse and more continuous 6 months before admission. Right kidney very movable and could be pushed in any direction.
1886	2	H. B.	Female.	56	Sharp pains in abdomen and loins for 2 years, getting worse. Right kidney freely movable.
1887	3	M. R.	Female.	25	Pain in abdomen with nausea and vomiting for 4 months. Tender movable kidney on right side.
1887	4	R. R.	Female.	40	Noticed swelling in right side of abdomen 15 years. Recurrent attacks of pain and nausea. Movable kidney on right side.
1887	5	S. B.	Female.	46	Shooting pains in abdomen and loins for three years. Both kidneys freely movable.
1887	6	S. B.	Female.	46	See above, No. 5.
1887	7	E. N.	Female.	36	Diarrhœa and vomiting 6 weeks before admission, and after that, noticed painful swelling on right side of abdomen.

OR MOVABLE KIDNEY.

(R. HENRY MORRIS.

Date of Operation.	Result.	Remarks.
Mar. 30th, 1886, R. Kidney.	Recovered.	Thick catgut passed through capsule and cortical part of renal substance. Discharged well, and kidney was felt in position some months afterwards. No sinus.
June 30th, 1886, R. Kidney.	Recovered.	Discharged well. Sutures into renal substance.
Jan. 29th, 1887, R. Kidney.	Recovered.	Three sutures passed through substance of right kidney, fixing it to parietes posteriorly. Discharged well.
Apr. 7th, 1887, R. Kidney.	Recovered.	Discharged well. Own method. 3 sutures in renal substance.
May 10th, 1887, L. Kidney.	Recovered.	Two silk sutures in fibro-fatty capsule, and two catgut sutures into renal substance used. Discharged well. (For second operation on the other kidney, *v.* No. 6.)
Dec. 7th, 1887, R. Kidney.	Recovered.	Two small silk sutures in capsule and three kangaroo-tendon sutures through renal substance. Discharged well. (For first operation, *v.* No. 5.)
Oct. 12th, 1887, R. Kidney.	Recovered.	Six sutures used. Discharged well.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1889	8	H. F.	Female.	30	Attacks of pain — worse on movement—in right loin for seven years. Right kidney movable.
1889	9	L. H.	Female.	38	Fifteen months ago fall from a chair. Eight months ago premature confinement. Abdominal pain and nausea for 5 months. Right kidney movable and tender.
1889	10	Mrs. C. (P)	Female.	36	Acute attacks of right renal colic, often necessitating prolonged administration of chloroform.
1890	11	E H.	Female.	49	Pain in loins for 3 months, and noticed a freely movable lump in the right side. A hard, smooth, elastic tumour felt, freely movable, and descending with respiration.
1890	12	J. W.	Female.	32	Swelling felt in abdomen for 2 years. Aching pain for 6 months. A smooth, hard, elastic swelling moving on respiration was found in right lumbar region.
1891	13	Mrs. I. (P)	Female.	34	Pain on right side very severe at times.
1891	14	Miss S. (P)	Female.	25	Pain and sense of dragging.

Date of Operation.	Result.	Remarks.
Mar. 1st, 1889, R. Kidney.	Recovered.	Three kangaroo-tendon sutures passed through the renal cortex. Discharged well.
June 8th, 1889, R. Kidney. Aug. 8th, 1889, Removal of uterine appendages, and uterus fixed.	Recovered from operation, but not improved.	Sutures in renal substance. No relief. After second operation, was known to be well many months later. (*V. Med. Hosp. Report*, 1890, p. 149.)
Jan. 17th, 1889, R. Kidney.	Recovered.	Two kangaroo-tendon sutures passed through the substance of the kidney and into the muscles. Two silk sutures passed into areolar tissue capsule in front, and one behind, and brought forward to the skin. A short sinus in the centre of the scar persisted for a short time, but finally healed.
Nov. 19th, 1890, R. Kidney.	Recovered.	Four kangaroo-tendon sutures passed through the capsule and renal substance. Discharged well.
Dec. 10th, 1890, R. Kidney.	Recovered	Three kangaroo-tendon sutures were passed through the capsule into the renal substance, and then through the muscular walls of the parietes.
Apr. 5th, 1891, R. Kidney.	Recovered.	The kidney was fixed by 1 kangaroo tendon and 2 stout catgut sutures. The kangaroo tendon was passed deeply into structure of the kidney. Was seen Dec. 14th, 1892, and was quite well.
Apr. 6th, 1891, R. Kidney.	Recovered.	The kidney was fixed (author's method), and patient was seen to be quite well a year afterwards. Quite well ever since.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1892	15	Miss B. (P)	Female.	30	Three severe attacks of right renal colic within 8 months. Right kidney very mobile. Can be pushed over to middle line, downwards into iliac fossa, and upwards under liver.
1892	16	L. W. (P)	Male.	27	Symptom resembling renal calculus. Previous operation for another affection, not renal, on Sep. 20th, 1892, and for which he rested completely until Oct. 3rd, but with no relief; so movable kidney was fixed.
1892	17	Miss R. (P)	Female.	48	Occasional attacks of pain in right renal region for 10 years. The attacks have been getting more frequent. Right kidney is movable.
1892	18	M. M.	Female.	43	Intermittent pain in back, and especially the right loin, for five years.
1893	19	E. C.	Female.	41	Sharp pains in left lumbar region, with attacks of vomiting. Right kidney found to be freely movable.
1893	20	L. B.	Female.	47	Right kidney had been previously sutured to abdominal wall by another surgeon. A year afterwards it again became movable, and accompanied by pain, and on examination the kidney was found to be freely movable.

Date of Operation.	Result.	Remarks.
Oct. 1st, 1892, R. Kidney.	Recovered.	The kidney was fixed (author's method), and the patient made a good recovery.
Nov. 23rd, 1892, L. Kidney.	Recovered.	Nephropexy by author's method. Wound healed well. Patient seen in 1893 and was well.
June 16th, 1892, R. Kidney.	Recovered.	The kidney was excessively movable and placed so low down that its upper end first presented itself at the lumbar incision. Three kangaroo-tendon sutures were used to fix the organ to the loin. A shallow sinus remained which subsequently closed. In excellent health ever since.
Dec. 22nd, 1892, L. Kidney.	Recovered.	The kidney was slightly enlarged. An incision was made into convex border, but nothing abnormal found. The kidney was fixed to the surrounding structures by a kangaroo tendon passed through its posterior surface, and the capsule was also fixed.
May 30th, 1893, R. Kidney.	Recovered.	The kidney was fixed by thick catgut suture passed into it and also through the capsule and the abdominal wall. A piece of the renal capsule was brought up through the wound and cut off. Wound healed well.
Dec. 5th, 1893, R. Kidney.	Recovered.	The kidney was fixed to the abdominal wall by three kangaroo - tendon sutures passed into renal substance. Wound healed well. (See Table IV., No. 25.)

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1893	21	Mrs. S. (P)	Female.	23	Pain in right kidney, frequency of micturition, constipation, nausea. Paroxysmal seizures. Worse since marriage.
1893	22	Mrs. L. (P)	Female.	63	Pain in right side. Dyspeptic troubles, nausea and constipation.
1894	23	Mrs. S. (P)	Female.	32	Aching pain in right renal region for 17 months. Right kidney normal and smooth, moves like a ball, and descends when patient rises from recumbent to sitting posture.
1894	24	Mrs. H. (P)	Female.	30	Paroxysmal attacks of pain on right side, resembling renal colic. Pain and tenderness on manipulation, but no movement of kidney made out.
1894	25	Mrs. S. (P)	Female.	48	Micturition very frequent. Right kidney very mobile and complicated by an abdominal swelling, which proved to be distended gall-bladder.
1894	26	Mr. B. (P)	Male.	20	During one year occasional severe attacks of colic, accompanied by hæmaturia. Passed a stone in November, 1893, and 2 fragments since; but still had pain in right renal region.

Date of Operation.	Result.	Remarks.
February 14th, 1893.	Recovered.	Wound healed well. Complete relief of symptoms. Author's method. Three sutures through substance of kidney.
April 13th, 1893.	Recovered.	Author's method. Complete recovery from operation in spite of severe attacks of acute bronchitis. Died some months subsequently of hemiplegia.
Feb. 4th, 1894, R. Kidney.	Recovered.	Kidney was fixed by author's method, and patient made a rapid and complete recovery.
Feb. 16th, 1894, R. Kidney.	Recovered	Kidney freely movable upwards, downwards, and towards the median line. Kidney incised and found to be in an early stage of hydronephrosis. No calculus. Catgut sutures were passed into the kidney substance (and the shortened fibro-fatty capsule). Healed by first intention.
Feb. 23rd, 1894. Nephropexy by Hahn's method. Cholecystotomy.	Recovered.	By lumbar incision, stone felt in cystic duct. Langenbuck's incision. Cholecystotomy; gall stone removed. The kidney was fixed to the loin by its fibro-fatty capsule only. Patient made good recovery, and has remained well since. (*V. Brit. Med. Journ.*, 1895, Vol. 1, p. 241.)
July 5th, 1894, R. Kidney.	Recovered.	The kidney was extremely movable, and fell over to the front of the spinal column. It was brought to the surface of the wound and incised, but no stone was found. Renal incision sutured. The kidney was fixed by 3 sutures into renal substance, and the wound healed well.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1894	27	E. R.	Female.	27	Noticed a lump in right side for 5 years; also constant attacks of aching pain. Right kidney could be felt to be movable.
1895	28	Mr. S. (P)	Male.	37	Constant renal pain for 6 years. Hæmaturia after exercise for several months. Urine always contains excess of phosphates.
1895	29	C. P.	Female.	30	A dragging pain, sometimes very acute, in the right loin for 3 years. Pain worse after exercise. Kidney freely movable, both in downward and lateral direction.
1895	30	M. H.	Female.	37	Pain in back and groins for 9 months, and some frequency of micturition and slight pyuria. The right kidney was freely movable.
1895	31	A. W.	Male.	47	Paroxysmal pain in the right loin. There was tenderness and fulness of the right kidney, which was distinctly movable.
1895	32	Miss B. (P)	Female.	37	Continual pain. Has laid up twice for 3 or 4 weeks during last 18 months, but the pain always returns again when she gets up.

Date of Operation.	Result.	Remarks.
g. 7th, 1894, R. Kidney.	Recovered.	The kidney was carefully examined for stone, but none found (it was not incised). It was firmly fixed to the abdominal wall by 3 kangaroo-tendon sutures passed through the kidney substance.
g. 3rd, 1895, L. Kidney.	Recovered.	The kidney was brought on to the loin and thoroughly examined. An incision was made in the convex border and the pelvis explored, but nothing found, and the wound was sutured. The kidney, however, was freely movable, and it was fixed. A stone was passed many months afterwards.
r. 13th, 1895, R. Kidney.	Recovered.	Own method. Good recovery. Quite relieved; but returned November 12th, 1895, complaining of some pain in left side, but no operation deemed necessary. Right kidney satisfactorily fixed.
ı. 29th, 1895, R. Kidney.	Recovered.	The kidney appeared quite healthy. The kidney was fixed to the abdominal wall by 3 stout gut sutures passed through the cortex on the anterior surface of the kidney. Uninterrupted recovery. Discharged well.
ı. 2nd, 1895, R. Kidney.	Recovered.	The kidney appeared quite healthy, and was sutured to the walls by 3 strong gut sutures. Wound healed well.
ly 24th, 1895, L. Kidney.	Recovered.	Kidney fixed. Wound healed by first intention, and patient was seen to be quite well in August, 1896.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1895	33	W. M.	Male.	40	Attacks of pain in left side and vomiting for 4 years. Occasional hæmaturia.
1895	34	F. B.	Male.	22	Paroxysmal pain in right side, shooting into right testis, with severe hæmaturia since April, 1895. Micturition increased in frequency and urine in quantity.
1895	35	Miss M. (P)	Female.	39	First seen in 1890. Previously had suffered from ovaritis. Intense pain, sickness, dragging feeling, and constipation. Dyspeptic troubles. Worse at menstrual periods, when kidney would greatly swell in size.
1895	36	Mrs. H. (P)	Female.	23	Both kidneys were movable and the left greatly increased at intervals. Diagnosed by me as intermittent hydronephrosis.
1895	37	Miss J. (P)	Female.	24	In 1891 strain from lifting, when she felt something "go." Since then attacks of sharp stabbing pain in right side, shooting along in direction of ureter.

Date of Operation.	Result.	Remarks.
v. 16th, 1895, L. Kidney.	Recovered.	The kidney appeared puckered on the surface and the perirenal tissue was very dense and adherent. An incision was made into the convex border and the kidney was explored, but nothing was found. The renal incision was sutured, and the kidney, which was movable, was fixed. The wound healed well, and patient wrote afterwards, saying he was much better since the operation. Has reported himself every 6 months since, and keeps in perfect health.
v. 30th, 1895, R. Kidney.	Recovered.	An incision was made into convex border of kidney and the finger introduced, but no stone found. The kidney, which was freely movable, was fixed by sutures through capsule and cortex.
Oct. 30th, 1895.	Recovered.	Own method. Good recovery. Right-sided pain and dragging quite relieved, but pain in hypogastrium, subsequently felt at monthly periods. Suffering at periods and profuse floodings keep her in poor health.
t. 28th, 1895, L. Kidney.	Recovered.	The left kidney was found to be shrunken and hydronephrotic, with dilated pelvis, and it was fixed to the loin. Good recovery from operation, but subsequent intermittent attacks, and removal advised. Nephrectomy was subsequently performed in this case by another surgeon in September, 1896.
ly 11th, 1895, R. Kidney.	Recovered.	Kidney had been fixed on April 12, 1895, by another surgeon. Subsequent attacks of intermittent hydronephrosis. July 11th the kidney was found fixed, but in nearly transverse position. It was detached and refixed in normal position. Quite well and without pain when last seen in September, 1895; but it was a question if hydronephosis might not recur. Not heard of since.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1895	38	Mrs. P. (P)	Female.	43	Pain in right renal region, especially after any exertion. Some pyuria. The right kidney was felt to be movable.
1895	39	Miss P. (P)	Female.	42	Pain for a long time in right side of abdomen, which is made worse by exercise and always ceases during rest. Right kidney very freely movable in all directions.
1896	40	Miss P. (P)	Female.	35	Pain in left side and sickness for 6 years. Pain is followed by passage of large amount of urine. The left kidney was very mobile, and occupied an obliquely transverse position. The right kidney was also very movable, but not the seat of much pain.
1896	41	Mrs. D. (P)	Female.	40	Intensely neurotic. Dyspeptic symptoms, constipation, dragging pain in right side. Right kidney very movable.

Date of Operation.	Result.	Remarks.
rch 27th, 1895, both kidneys explored by abdominal incision through right semi-lunaris, and then the right was explored and fixed through a lumbar incision.	Recovered.	By the abdominal incision the left kidney was felt to be normal in size and position, while the right was freely movable in any direction. The abdominal wound was closed, and the right kidney was exposed by a lumbar incision, explored through incision in convex border, and fixed by 3 sutures. Wound healed well. 9th June, 1896: "doing wonders in walking, and feeling quite well." In December, 1897, heard she was suffering in same side, after a fall over piece of furniture, and now has relapses of pain.
ı. 30th, 1895, R. Kidney.	Recovered.	The kidney was fixed with 3 silk sutures. Wound healed rapidly, but later on broke down at one spot, and 2 silk sutures came away. Has been greatly benefited by operation. Sinus healed.
y 5th, 1896, R. Kidney	Recovered.	The right kidney was exposed, brought on to the loin, and carefully examined, but not incised. Three sutures were passed into post. surface of the organ and returned through fascia and muscles. Wound healed by first intention. The left kidney was subsequently also fixed. (*V.* Table V., No. 43.)
ril 19th, 1896, R. Kidney.	Recovered.	The kidney was fixed and patient much improved, and the wound healed; but subsequently a shallow fistula formed. Became pregnant in June, 1896, and between 2 and 3 months after labour, symptoms of general septicæmia occurred. This was in June, 1897. Nephrectomy was performed after a few days of marked typhoid symptoms. Kidney found well fixed, but softened, and in condition of ascending suppurative pyelonephritis. (See Table VIII., No. 5.)

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1896	42	L. H. (P)	Female.	53	In September, 1895, had severe pain in right renal region, attended with hæmaturia, and a very severe repetition occurred in 1896, with a great deal of hæmaturia. The right kidney was felt to be enlarged, and very movable and very tender.
1896	43	Miss P. (P)	Female.	35	For symptoms and previous operation on right kidney, *v.* Table V., No. 40. Pain in left kidney, but has never been so severe since its twisted position was rectified by manipulation shortly before operation on the right kidney.
1896	44	Mr. S. (P)	Male.	43	Occasional attacks of pain and hæmaturia since Oct., 1895—worse after exercise. Right kidney movable.
1896	45	Miss H. (P)	Female.	38	Pain in right side and movable kidney for 2 years.

Date of Operation.	Result.	Remarks.
March 25th, 1896, R. Kidney.	Recovered.	The kidney was very large, and on incising it, it was found that the pelvis and calyces were distended with blood-clot, some of which were blackish-grey in colour. *Intra-renal hæmorrhage.* No calculus was found, and ureter was normal. The wound in the kidney was closed by fine sutures and the kidney fixed in position. After the operation the pain was entirely relieved, and the kidney rapidly subsided, but hæmaturia continued for weeks. The patient subsequently recovered, and is now well.
July 15th, 1896, L. Kidney.	Recovered.	The kidney was flaccid and hydronephrotic. It was fixed in a similar manner to the right. A purulent fistula remained for a time, and pus was passed in urine, but finally closed. (For previous operation, *v.* Table V., No. 40.)
Jan. 22nd, 1896, R. Kidney.	Recovered.	Kidney exposed, brought to surface of wound, and incised along convex border. No stone found. The renal wound was sutured, and the kidney was fixed by two silk sutures passing into kidney and returned through muscles and fascia of loin. Fistula remained for several months, due to sutures escaping, and then finally closed. A small oxalate and phosphate of lime calculus was passed on Feb. 9th, 1897.
Dec. 6th, 1896, R. Kidney.	Recovered.	The kidney was fixed with 3 sutures. The wound healed by first intention. A fistula formed later, and kept open till 2 sutures escaped, and then healed permanently.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1896	46	E. S.	Female.	54	Pain and tenderness in right loin. Abdominal walls very lax. On standing, right kidney slips altogether below the umbilicus.
1896	47	Miss E. (P)	Female.	56	Very movable kidney. Paroxysmal pain (with vomiting) in right side. Sense of pressure and dragging in right side. Attacks last for 2 or 3 days, during which she is very prostrate, and looks sallow, pinched, and very ill. Symptoms several years.
1897	48	Miss P. (P)	Female.	36	Previously had uterine appendages removed for tuberculous disease. Pus was passed by the rectum, and had also once an attack of hæmaturia. There was some doubt as to enlargement of right kidney, as it was obscured by the liver, which was lower than normal.
1897	49	Mrs. A. (P)	Female.	38	Right hip-joint ankylosed since childhood. Frequent attacks of pain with frequency of micturition for a year. Left kidney very movable. A little pus and several crystals of calcium oxalate in urine.
1897	50	L. W. (P)	Male.	49	Very neurotic, but led an active life in Army Indian service. Since 1895 attacks of acute pain in left renal region. Porter-like urine during attacks. Hæmaturia, with pain, especially after walking, since July, 1896. There is now a heavy aching pain in line of ureter. Some stenosis of sigmoid flexure.

Date of Operation.	Result.	Remarks.
May 25th, 1896, R. Kidney.	Recovered.	Kidney fixed by 3 sutures passed deeply through the kidney tissue. March, 1898—says she has been better since the operation than for many years past.
Feb. 12th, 1896, R. Kidney.	Recovered.	Author's method. Rapid healing. Complete recovery from former symptoms. Seen from time to time. Is quite free of old symptoms at the present time.
June 2nd, 1897, R. Kidney. Exploratory laparotomy. Firm adhesions found shutting off the kidney, so an incision in the loin was made.	Recovered from operation. Symptoms relieved, but patient still feeble.	The kidney was found to be overlapped by the right lobe of the liver, but normal, though freely mobile. The kidney was thoroughly examined, but not incised. There were marked adhesions between the intestine and kidney. Some of the fibro-fatty capsule was cut away, and one suture was passed through the kidney. Wound healed well.
Feb. 19th, 1897, L. Kidney.	Recovered.	Kidney found to be excessively movable, having a complete mesonephron. Incised and examined, but no stone or tubercle found. The incision was sutured and the kidney was fixed by 3 sutures. A purulent fistula existed for some time, and has not yet quite healed.
Dec. 16th, 1897, L. Kidney.	Recovered.	Kidney incised along convex border. Explored. Sutured with 3 sutures. Ureter catheterised, but not found to be satisfactorily free. The slight obstruction was thought to be due to kinking. No stone. Fixed by author's method. Complete and rapid healing. Some pain, with constipation, since. No trace of old pain and attacks so far. (*Postscript.*—He passed a small ovoid calculus on May 28th, 1898.)

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1897	51	Miss M. (P)	Female.	41	For 11 years pain in right renal region. Never hæmaturia. Of late perpetual aching, and every 6 months (about) very severe paroxysmal attacks. Is now unable to follow calling as teacher of music.
1897	52	P. C.	Female.	37	Sharp attacks of pain in the right side. Frequency of micturition. The right kidney moves with respiration, and can easily be moved by pressure with the hand.
1897	53	B. C.	Male.	26	Pain in left side for 2 years, and almost constant for the last year.
1897	54	E. A.	Female.	29	In Oct., 1896, patient strained herself by lifting a weight. After that occasional pain in loins and hæmaturia. Urine contained some pus, blood, and albumen.

Date of Operation.	Result.	Remarks.
Dec. 6th, 1897, R. Kidney.	Recovered.	The kidney was fixed by means of a tendon of the longissimus dorsi. Vulliet's method modified. Recovery without a fistula.
June 14th, 1897, R. Kidney.	Recovered.	Kidney fixed by a modification of Vulliet's method. Wound healed well, and patient discharged free from pain.
June 21st, 1897, L. Kidney.	Recovered.	The kidney was found to be very movable, and an incision was made into its substance, but nothing felt. The kidney was firmly fixed to the deeper layers of the parietal wall by several sutures passed through a detached portion of the fibrous capsule. Tuffier's method. Wound healed.
Dec. 17th, 1897, R. Kidney.	Recovered.	The kidney was found to be freely movable and rather small. The cortex was incised and the kidney explored. A small incision was also made in the renal pelvis, and the ureter catheterised; found to be quite free from obstruction. Wound in pelvis closed by one suture, and that of renal cortex by four. The kidney had the appearance of chronic tubular nephritis. The kidney was fixed by two sutures passed through its capsule and the edges of the deep tissues of parietal incision. Wound healed well, patient feels well, but urine still contained some blood and albumen.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1898	55	E. W.	Female.	28	Pain in back for 2 years, suddenly got much worse in Nov., 1897. Left kidney freely movable in almost any direction, and the right kidney was also slightly movable.
1898	56	M. I.	Female.	29	Dragging pain in right loin for 3 years. Worse on exertion. The right kidney was slightly enlarged and freely movable.
1898	57	E. E.	Female.	40	Intermittent pain in right loin in Nov., 1897; and soon afterwards a swelling was noticed. The attacks of pain were worse after exertion. Urine was often dark in colour. The right kidney was found to be freely movable.

Date of Operation.	Result.	Remarks.
Feb. 14th, 1898, L. Kidney.	Recovered.	The kidney was fixed by a modification of Vulliet's method. Wound healed well.
Feb. 3rd, 1898.	Recovered.	The kidney was fixed by a modification of Vulliet's method. Wound healed well.
Feb. 28th, 1898.	Recovering.	The kidney was exposed by an incision through the loin, and when examined with the fingers a peculiar crackling occurred like that produced by surgical emphysema. On opening the capsule a large subcapsular hæmorrhage was found, and the capsule had been completely detached from the parenchyma. An incision was made into the convex border of the kidney and the organ explored, but nothing further was found. The cut edges of the renal capsule were sewn to the edges of the incision, leaving a part of the kidney uncovered by capsule, in contact with the abdominal wall.

TABLE VI.—HYDRONEPHROSIS

PERFORMED BY

YEAR.	No.	INITIAL.	SEX.	AGE.	LEADING SYMPTOMS.
1883	1	Mr. J.	Male.	22	Acute symptoms of renal colic. Enormous tumour in left loin.
1885	2	G. D.	Male.	43	Pain in loins and frequency of micturition. Stricture of urethra for 12 years. Fulness over region of right kidney. Urine contained pus and blood.
1888	3	G. C.	Male.	34	Duration of symptoms 2 years. Attacks of pain in left loin. Pyuria and occasional hæmaturia.
1888	4	Mrs. C.	Female.	24	Swelling in right loin first seen in May, 1888, after an injury. Urine normal.
1889	5	Miss S.	Female.	37	Renal swelling in left loin for 15 months, which had been aspirated.
1889	6	E. F.	Female.	51	Pain in right loin for 6 years; much worse during last 6 months. Frequency of micturition, albuminuria, and pyuria. Indistinct swelling in the right loin.

ND PYONEPHROSIS.

MR. HENRY MORRIS.

Nature and Date of Operation.	Result.	Remarks.
Nephrotomy. Dec. 22nd, 1883. L. Kidney.	Recovered.	A large hydronephrotic kidney was found and very large quantity of brown inodorous fluid withdrawn, and also some dark-brown blood-clot. Cyst wall was sutured to skin. Urinary fistula remained. Patient seen in perfect health 14 years later.
Nephrotomy. July 23rd, 1885. R. Kidney.	Recovered.	A large quantity of purulent urine escaped when the kidney was incised. The edges of the cyst were stitched to the abdominal wound and drained.
Nephrotomy. Oct. 26th, 1888. L. Kidney.	Recovered.	The kidney was enlarged, and at one part contained a quantity of pus, which was evacuated, and the kidney drained.
Nephrectomy. Dec. 30th, 1888. R. Kidney.	Recovered.	Kidney very hydronephrotic. About 45 oz. of clear fluid withdrawn before the organ was removed.
Nephrectomy. Jan. 4th, 1889. L. Kidney.	Recovered.	The kidney was in an advanced state of hydronephrosis, probably the result of a previous pelvic cellulitis. (Subsequent nephrotomy on the right kidney, *v.* Table VI., No. 9.)
Nephrectomy. March 1st, 1889. R. Kidney.	Died Mar. 5th.	Kidney in an advanced state of suppuration. P.M. The other kidney was hydronephrotic. The disease was secondary to pelvic cellulitis and compression of the ureters.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1893	7	H. N.	Male.	7	Pain in right loin for 1 year. Hæmaturia, pyuria, and albuminuria.
1893	8	Mrs. R.	Female.	56	Duration of symptoms, 2 years. Pain in right loin and frequency of micturition. Very offensive pus in urine.
1893	9	Miss S.	Female.	41	Previous nephrectomy for hydronephrosis in January, 1889. Tumour in right hypochondriac region the size of a child's head and very movable.
1893	10	Miss W.	Female.	29	Had suffered for some years from attacks of pain in right lumbar region, associated with a swelling which was taken to be a floating kidney. In June, 1893, the pain became worse, and was accompanied by fever and rigors.
1893	11	Miss W.	Female.	29	Nephrectomy on account of reappearance of a hydronephrotic tumour after nephrotomy. (*V.* No. 10.)

Nature and Date of Operation.	Result.	Remarks.
Nephrectomy. Jan. 10th, 1893. R. Kidney.	Recovered.	Kidney in advanced state of hydronephrosis. The upper end of the ureter was thickened. Recovery without a sinus. (*V. Lancet*, Vol. 1, 1894.)
Nephrectomy. Jan. 29th, 1893. R. Kidney.	Died Feb. 3rd.	Kidney a fibrous sac with lining membrane roughened by papillary elevations. Sac filled with very offensive material like semi-fluid pus streaked with some inspissated material the colour of damson juice. Died of uræmia. No P.M.
Nephrotomy and fixation of R. Kidney. Feb. 11th, 1893.	Recovered.	The kidney, which was hydronephrotic, was fixed to the loin and drained. The quantity of urine which escaped by the fistula gradually decreased, and the flow soon became well established by the natural passages. Nearly 3 pints of healthy urine were passed daily, and the kidney contracted to the size of a clenched fist, and the patient was better than she had been for years.
Nephrotomy. July 20th, 1893. R. Kidney.	Recovered.	Kidney formed a large lobulated cyst, and when incised was found to contain ¾ pint of straw-coloured fluid. There was a considerable amount of secreting substance left, so the kidney was sutured and the wound closed. The patient was much relieved for a few days, but the tumour refilled and nephrectomy was performed. (*V.* No. 11.)
Nephrectomy. July 28, 1893. R. Kidney.	Recovered.	The kidney was removed, the wound healed well, and the patient rapidly gained weight and felt quite well. (For previous nephrotomy and the condition of kidney, *v.* No. 10.)

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1893	12	M. K.	Male.	22 hrs.	Retention of urine. Two large tumours in the loins.
1894	13	Mrs. J.	Female.	27	Movable right kidney for several years, followed later by pain and enlargement of right kidney, with frequency of micturition and pyuria.
1895	14	E. A.	Female.	28	Pain in left side for 5 years, paroxysmal in character. A perinephric abscess previously opened, which left a sinus.
1895	15	M. J.	Female.	35	Pain and large tumour in left loin. No pus in urine.
1895	16	E. S.	Female.	21	Pain and swelling in left loin. Pyuria, albuminuria and slight hæmaturia.
1897	17	Mrs. H.	Female.	57	Symptoms 9 years. Frequent attacks of pain in left side. No definite alteration in urine. Passed one or two concretions of doubtful character.

Nature and Date of Operation.	Result.	Remarks.
Left ureterotomy. Right nephrotomy. Dec. 1st, 1893.	Recovered and remained well for many weeks. Subsequently died of inanition.	Preliminary laparotomy, followed by nephrotomy on each side. The condition was one of double congenital hydronephrosis, and a large quantity of clear fluid was obtained from each kidney. Death from diarrhœa and exhaustion on March 2nd, 1893. (*Vide Lancet*, June 8, 1895.)
Nephrotomy. Nov. 30th, 1894. R. Kidney.	Recovered.	Kidney in advanced state of pyonephrosis. Edges of cyst wall were stitched to the skin. Recovery without a sinus.
Nephrectomy. Aug. 28th, 1895. L. Kidney.	Died Aug. 28th.	Kidney contained large amount of pus. Also there was a large amount in the tissues round the kidney. Patient died from collapse the same day as the operation. No P.M.
Nephrectomy. Oct. 23rd, 1895. L. Kidney.	Recovered.	A preliminary laparotomy was done and the other kidney felt to be normal. The left kidney was enormously enlarged and full of pus. Ureter very narrow. Recovery without a sinus.
Nephrectomy. Nov. 22nd, 1895. L. Kidney.	Recovered.	Kidney in advanced state of hydronephrosis. Recovery with only a small superficial sinus when she left hospital, and which has almost certainly healed. Not heard of since.
Nephro-Ureterectomy. Oct. 22nd, 1897. L. Kidney.	Recovered.	Kidney small and very sacculated. Ureter excessively small in diameter, with very thin walls. Plastic operations were done upon this ureter, but not giving promise of satisfactory results, were abandoned. A large part of the ureter was removed with the kidney. Recovered.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1897	18	Mrs. B.	Female.	42	Frequent and painful micturition in 1894, which was thought to be due to cystitis, and under treatment disappeared in a year. Pyuria since Oct., 1896, but no return of frequency of micturition. Intermittent pain in right renal region for 3 years. A large tender swelling was found to be present in the right renal region.
1898	19	Mrs. M.	Female.	29	Aching in right side. Frequency of micturition, amounting almost to incontinence. Slight pyuria. Had several falls while hunting, and a definite injury 18 months ago.
1898	20	Mr. C. H. R.	Male.	40	Hæmaturia in 1885, followed by right renal colic—one attack so severe that it was thought it would prove fatal. Interval of freedom and fresh severe attacks in 1894. Exploratory operation by another surgeon in Nov., 1895. No stone. Kidney found distended and displaced, and was fixed. Symptoms continued unabated to present time, and are now chiefly referred to neck of bladder.

Nature and Date of Operation.	Result.	Remarks.
Nephrectomy. Feb., 1897. R. Kidney.	Recovered.	A large sacculated pyonephrotic kidney containing thick purulent urine. In excellent health at present time.
Ureterotomy and nephropexy for movable hydronephrotic kidney. Feb. 5th, 1898. R. Kidney.	Recovered.	After exploring the bladder with negative result, an incision into right loin exposed the kidney. Tough, fibrous adhesions bound down the upper pole of the organ, which was rotated through a quarter of a circle, the hilum looking upwards. The renal pelvis was considerably dilated, and the ureter was stenosed at junction of infundibulum.
Nephrectomy and partial ureterectomy. March 4th, 1898. R. Kidney.	Recovered.	Kidney was enormously sacculated, only thin shell forming wall. The ureter was of immense thickness, and its mucous membrane coarsely granular, and grated like a calculus on passing a bougie. Marked periureteritis. Bladder normal.

TABLE VII.—OPERATIONS FOR TUBER

PERFORMED BY

YEAR.	NO.	INITIALS.	SEX.	AGE.	LEADING SYMPTOMS.
1888	1	T. S.	Male.	28	Hæmaturia in 1886, followed by pain in left loin and testicle. Frequency of micturition for 1 year. Considerable swelling in left loin. Pyuria. Tubercular nodule in left epididymis.
1888	2	T. S.	Male.	28	Nephrotomy had been previously performed. (For symptoms, *v.* No. 1.)
1888	3	J. M.	Female.	49	Noticed a tumour in left loin for 9 years. Pain, hæmaturia, and passage of gravel and blood-clot. Albuminuria and pyuria. A large tender swelling present in left loin.
1889	4	Mr. G.	Male.	27	Pain in right renal region with slight hæmaturia and small quantity of pus.

ULOUS DISEASE OF THE KIDNEYS.

MR. HENRY MORRIS.

Date of Operation.	Result.	Remarks.
Nephrotomy. Feb. 11th, 1888. L. Kidney.	Recovered.	The kidney, which was much enlarged, was incised, and 3 oz. of pus escaped. The pelvis was large and sacculated, and the wound was drained, recovered with a sinus, and subsequently nephrectomy was performed. (*V.* No. 2.)
Nephrectomy. May 9th, 1888. L. Kidney.	Died May 12th.	The kidney was much enlarged and contained tubercular abscesses. P.M., no injury to peritoneum or other organs. The opposite kidney was fatty and congested, and tubercle was found in the other organs of the body. There was also some lardaceous disease of spleen and intestines. (For previous operation, *v.* No. 1.)
Nephrotomy. Sep. 29th, 1888. L. Kidney.	Recovered from operation, but died on Oct. 28th from tubercular cystitis and pyelitis.	The kidney was incised and a quantity of pus escaped. P.M., the left kidney was reduced to a series of loculi containing caseous material, and drained by a nephrotomy wound. Intense cystitis, and pyelonephritis of the right kidney. Caseation of retro-peritoneal glands. Old tubercle at apex of lung.
Nephrectomy. July 20th, 1889. R. Kidney.	Recovered from operation, but died on Sep. 9th owing to disease of the other kidney.	Capsule very adherent. Tubercles scattered over surface of kidney, and several patches of diseased tissue in the kidney substance. P.M. made in the country; the left kidney was found to be in an advanced state of cystic degeneration. ? Polycystic.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1890	5	A. A.	Female.	27	Pain in left loin for 3 years. Great frequency of micturition. Rounded, fluctuating swelling in left lumbar region.
1890	6	C. W.	Male.	24	Pain in left lumbar region for 7 years. Tenderness over left kidney. Albuminuria and pyuria.
1890	7	C. W.	Male.	24	Nephrectomy on account of fistula and hectic temperature. (*V.* No. 6.)
1892	8	A. F.	Male.	28	Repeated attacks of pain in right loin for 4 years. Frequency of micturition. Albuminuria, pyuria, and hæmaturia. Some tenderness in right loin.

Date of Operation.	Result.	Remarks.
Nephrectomy. May 23rd, 1890. L. Kidney.	Died May 27th.	A perinephric abscess and large areas of tuberculous disease of the kidney were found. Patient died from suppression of urine. P.M., the *right* kidney was in an advanced stage of disease and the pyramidal substance was almost destroyed.
Partial resection. Nov. 28th, 1890. L. Kidney.	Recovered.	Kidney drawn out on to loin. Several abscesses were found in the cortex. These were opened and erased, and the kidney was incised through its convex border and explored. The kidney was removed on Dec. 20th, owing to persistence of a discharging sinus and a hectic temperature. (For nephrectomy, *v.* same table, No. 7.)
Nephrectomy. Dec. 20th, 1890. L. Kidney.	Recovered.	The kidney was much enlarged, weighing 11¼ oz., and studded throughout with small tubercular abscesses. The infundibulum of the ureter contained a quantity of pus, and the walls were covered with a fungating granulomatous growth. The wound healed, and patient was known to be quite healthy and well in 1893. (For previous nephrotomy, *v.* same table, No. 6.)
Erasion of six tuberculous abscesses. April 8th, 1892. R. Kidney.	Recovered.	Six saccules were found in the kidney, containing chalky purulent material. This material was scraped out and the abscess cavities washed out with perchloride of mercury and iodoform. Wound healed well, and patient was known to be well in Sept., 1896.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1892	9	P. J.	Male.	35	In 1881 a nodule in epididymis ulcerated, but finally healed. After this he had an attack of cystitis with hæmaturia. In 1886 an acute attack of hæmaturia, which disabled him for 12 months. Frequency of micturition for 4 years. Acute pain in right lumbar region since 1891. Urine contained a large quantity of pus.
1892	10	Mrs. R.	Female.	—	An invalid for 16 years; a great deal of pain in the back; an intermittent swelling occurred in left loin. General loss of energy and despondency, and had had epileptiform convulsions on several occasions. Urine contained pus and a little blood.
1893	11	Miss J. (P)	Female.	24	Pain very severe at times; frequency of micturition and pyuria. Duration 15 months.

Date of Operation.	Result.	Remarks.
Nephrotomy. May 23rd, 1892. R. Kidney.	Recovered from operation, but died subsequently from tuberculosis of opposite kidney and lungs.	The right kidney was explored and brought to the surface. It was hypertrophied and lobulated. An incision into it failed to reveal any definite disease. The kidney was sutured and the wound closed. On June 7th the wound had healed, but the urine still contained pus and blood. The patient still continued to complain of pain in the right side, and, becoming much worse, he sank and died on June 13th. P.M. Recent miliary tubercles throughout both lungs and old scars at apices. The *left* kidney was transformed into a multilocular cyst with caseous contents, and the ureter was blocked by tubercular deposits. The right kidney showed the healed incision, but otherwise was healthy.
Nephrectomy. Aug. 16th, 1892. L. Kidney.	Recovered from operation. Died Sept. 18th, from uræmia.	The kidney was converted into a hollow sac with scarcely any secreting structure left. After operation the urine still retained the same characters, thus showing the other kidney to be diseased. Wound healed well, but on Sept. 1st she had a severe attack of convulsions. These subsided and the patient was able to go home, but she died on Sept. 18th. P.M. Right kidney was in a very advanced state of hydronephrosis.
Nephrectomy. March 9th, 1893. L. Kidney.	Recovered.	Kidney enlarged and completely disorganised by tubercular abscesses. Wound healed by first intention, but subsequently two shallow sinuses formed in the scar.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1893	12	E. N.	Female.	33	Frequency of micturition for one year. Dull pain in left lumbar region for one month. A large firm tumour present in left lumbar region Albuminuria, pyuria, and hæmaturia.
1893	13	Miss N. (P)	Female.	—	Pain and frequency of micturition.
1894	14	J. D.	Female.	26	Tumour in right loin, varying in size. Pain. Albuminuria, pyuria, and hæmaturia. The left kidney had been previously operated on by another surgeon for calculus, and a lumbar fistula followed.
1894	15	J. S.	Female.	13	Frequency of micturition and incontinence for 7 months. Some albumen, pus, and blood in urine. No pain in either loin. It was intended to explore each kidney separately, as bladder examination afforded no help.
1895	16	Mrs. B. (P)	Female.	28	Attacks of pain in left loin for 2 years. Pyuria and frequent hæmaturia.
1895	17	G. R	Female.	22	Pain for some years in right loin. Albumen, pus, and occasionally blood in the urine. Rounded tumour in the right loin.

Date of Operation.	Result.	Remarks.
Nephrectomy. March 14th, 1893. L. Kidney.	Recovered.	Caseous tuberculous nodules in the kidney. The infundibulum of the ureter was filled with pus. Wound healed well.
Nephrectomy. June 22nd, 1893. L. Kidney.	Died July 1st.	
Partial resection. Feb. 20th, 1894. R. Kidney.	Recovered.	A cyst and a tubercular abscess of the kidney were opened and excised; the kidney wound was sutured. Wound healed without a fistula. Subsequently I closed the left lumbar fistula by excising its renal as well as its parietal track. The sinus opened again about one year later.
Nephrotomy. June 22nd, 1894. R. Kidney.	Died June 24th.	An exploration of bladder had previously been made with negative result. The kidney was brought on to loin and explored through an incision in its convex border, but nothing abnormal was found. The incision in the kidney was closed with catgut sutures. Constant vomiting followed the anæsthetic, and suppression of urine occurred, and patient died. P.M. There was tuberculous disease of the *left* kidney, and a fistulous opening from the ureter into the vagina.
Partial resection. Jan. 22nd, 1895. L. Kidney.	Recovered.	The kidney was exposed, and 3 wedges of diseased parenchyma were excised, and the kidney substance brought together by catgut sutures. Recovered. Is well at the present time.
Nephrotomy. Jan. 25th, 1895. R. Kidney.	Recovered.	The kidney was enlarged, and on incising the convex border a quantity of pus was evacuated. The pelvis was much dilated, but no stone was felt. As the renal sac kept refilling, nephrectomy was performed. (*V.* No. 18.)

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1895	18	G. R.	Female.	22	Persistence of symptoms after previous nephrotomy (*v.* No. 17).
1895	19	M. C. S.	Female.	44	Large movable tumour in left hypochondrium, which had been first noticed 5 years previously, and had been long treated as a floating kidney. Latterly, much pain in the left side. Urine clear, acid, and free of albumen.
1896	20	A. C.	Female.	33	Pain and frequency of micturition for 11 years. Symptoms followed a strain. Swelling in left lumbar region first noticed in 1895.
1896	21	A. C.	Female.	33	Swelling in the left loin after a previous nephrectomy. (*V.* No. 20.)

Date of Operation.	Result.	Remarks.
Nephrectomy. March 9th, 1895. R. Kidney.	Recovered.	An exploratory abdominal incision was first made, and the left kidney found to be normal. The right kidney was then removed through a lumbar incision. Wound healed well, and patient reported herself quite well in June. (For previous nephrotomy, *v.* No. 17.)
Nephrectomy. Aug. 6th, 1895. L. Kidney.	Died Aug. 8th. Emphysema, bronchitis, and hypostatic congestion of both lungs.	The kidney was very large, dilated, and pouched, and contained a large quantity of pale-green caseous material. The kidney substance was almost entirely destroyed. The ureter, which was filled with calcareous matter, was traced down and ligatured 4 inches below the kidney. The patient was very sick after the anæsthetic, and died on Aug. 8th. P.M. Wound healthy, no injury to peritoneum. Right kidney pale, but not enlarged. (*Lancet*, Jan. 1st, 1898, p. 18.)
Nephrectomy. March 11th, 1896. L. Kidney.	Recovered.	The kidney was much enlarged, and filled with caseous pus. It was shelled out of its capsule and removed. There was a subsequent swelling in the loin, necessitating removal of capsule and part of ureter. (See *Lancet*, Jan. 1st, 1898, p. 19.) (*V.* No. 21.)
April 10th, 1896. Ureterectomy and removal of renal capsule.	Recovered.	The kidney had previously been shelled out of its capsule and removed. It was now found that the capsule had healed where it had been incised for the enucleation of the kidney, but had become greatly distended with blood-coloured serum. The capsule, which was calcified, was dissected out; and 4 inches of the ureter, which was much thickened, were also excised. Wound healed well. (*Lancet*, Jan. 1st, 1898, p. 19. For previous nephrectomy, *v.* No. 20.)

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1896	22	E. C.	Female.	29	Frequency of micturition, and dull pain in the left loin. Some enlargement and tenderness of left kidney. Nephropexy had been previously performed on the right kidney.
1896	23	E. R.	Female.	28	Pain in right loin for 4 years. Albumen and a little pus in the urine. Swelling in right loin. Nephropexy had been previously performed on the right kidney by another surgeon, There was also pain, tenderness, and distinct bulging in the left loin.
1896	24	E. R.	Female.	28	Swelling in right loin. (For further symptoms, *v.* No. 23.)
1897	25	F. B.	Female.	42	Frequency of micturition and attacks of pain in right loin. Renal tumour. Pyuria, hæmaturia, and albuminuria.
1897	26	Mr. P.	Male.	24	The upper part of the left kidney had been previously removed for tuberculous disease by another surgeon in 1897. Sinus remained. Micturition frequent. Pyuria and tubercle bacilli in the urine. Tenderness all along course of left ureter.

Date of Operation.	Result.	Remarks.
Partial resection. July 29th. L. Kidney.	Recovered.	The kidney was enlarged, and contained several caseating foci, which were excised, and the incisions into the kidney were sutured. The wound healed, but the patient had a high temperature and occasional rigors for some weeks after the operation. (Nephrectomy was subsequently performed in 1897, *v.* No. 28.)
Nephrotomy. Oct. 28th, 1896. L. Kidney.	Recovered.	Two abscesses were found in the convex border of the kidney. They contained caseous matter, and were thoroughly scraped out. Wound healed well. (For subsequent operation on the right kidney, *v.* No. 24.)
Nephrotomy. Nov. 18th, 1896. R. Kidney.	Recovered.	The kidney was enlarged and sacculated, and contained about 8 oz. of clear fluid. The kidney was drained, and eventually the wound healed well. (For previous operation on the left kidney, *v.* No. 23.)
R. Nephrectomy. March 1st, 1897.	Recovered.	Kidney distended and contained a great deal of pus in separate loculi.
Nephro-ureterectomy. Sept. 21st, 1897. L. Kidney.	Recovered.	The kidney was puckered and invaded throughout by tuberculous abscesses. The whole ureter as far as the vesiculæ seminales was excised; it was thickened and tortuous, and filled with caseous and purulent fluid. Wound healed well; but later on the scar broke down and some ligatures came away, after which the wound again commenced to close. (*V. Lancet*, Jan. 1st, 1898.)

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1897	27	Mrs. C.	Female.	27	Frequent micturition. Pain in left loin with frequent attacks of hæmaturia and pyuria for 7 years. Pain got much more frequent, and there was some fever.
1897	28	E. C.	Female.	30	A small sinus in left loin, following an abscess, which formed and opened 7 months after recovery from previous operation.

Date of Operation.	Result.	Remarks.
Nephro-ureterectomy. Oct. 28th, 1897. L. Kidney.	Recovered.	The kidney and part of ureter were excised. The kidney was small and very much atrophied. Made a good recovery, and wrote in 1898 saying she was in perfect health.
L. Nephro-ureterectomy. Nov. 17th, 1897.	Recovered from operation, but died Dec. 21st, after severe hæmoptysis, from tubercle of lungs and peritoneum.	The sinus was found to lead behind the kidney into a cavity situated in the left iliac fossa. The kidney was small and markedly cystic, with very little secreting substance. P.M. A retro-peritoneal collection of pus. Tubercles in lungs and peritoneum. An ulcer in the bladder. Right kidney small and contained some gritty particles. (For previous operation, *v.* No. 22.)

TABLE VIII.—NEPHRECTOMY FC

PERFORMED 1

YEAR.	No.	INITIALS.	SEX.	AGE.	LEADING SYMPTOMS.
1894	1	Mrs. B.	Female.		Nephrectomy, on account of renal fistula, the result of a previous nephrotomy performed by another surgeon.
1895	2	Mrs. F.	Female.	35	Illness first began after a miscarriage in 1892. Soon after an ovarian cyst formed, which was tapped through the vagina, and afterwards, in 1894, an ineffectual attempt was made to extract the tumour through an abdominal incision. A few weeks later an abscess appeared n relation to the kidney, and this was opened by an incision in the loin. The above operations were performed abroad, and a few months afterwards the scar in the loin broke down and pus was discharged.
1895	3	J. M.	Male.	20	Continuing hæmaturia after nephrotomy. (*V.* Table IV., No. 30.)
1897	4	Mrs. T.	Female.	40	One attack of renal colic about 1890. Right kidney enlarged. Patient suddenly taken with acute illness in fifth month of pregnancy. High temperature (105°), rapid pulse. Moderate amount of albuminuria and pyuria. Rigors. Improved. Induction of labour at 7½ months, then recovered and remained well till catamenial period in February, 1897.

'ISTULA, OR OTHER CAUSES.

MR. HENRY MORRIS.

Date of Operation.	Result.	Remarks.
July 19th, 1894. Nephrectomy.	Recovered.	Wound healed well. The kidney was small and sacculated. Is perfectly well to-day.
July 19th, 1895. Nephrectomy. R. Kidney.	Recovered.	The condition was one of pyonephrosis, the result of pressure on the ureter by pelvic adhesions consequent on the ovarian tumour. The kidney was small and granular. The pelvis and calyces were much dilated, and the secretory substance was much diminished. Microscopically, there was an advanced condition of interstitial nephritis. Had been previously operated upon by Vulliet of Geneva and Kocher of Berne. Is perfectly well at present time. Temperature day previous to operation 105°; two hours after nephrectomy, normal.
Feb. 12th. Nephrectomy. R. Kidney.	Died Feb. 13th	The patient was very collapsed, and died the day after operation. P.M. No injury to peritoneum. R. ureter normal, L. kidney pale.
Feb. 16th, 1897. Nephrectomy. R. Kidney.	Recovered.	Kidney enlarged and solid. On incision there was no pus, but numerous deposits of streaked, creamy appearance, the size of small marbles. Recovered very rapidly, and remained well till December, 1897, when the left kidney was threatened by fresh pregnancy. Labour was induced, since which fever, pain, and pyuria have ceased, and she is now well again.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1897	5	Mrs. D.	Female.	41	Nephropexy on right kidney in April, 1896. Wound healed and remained sound for a time, but later on some sutures came away and a fistula formed. After the termination of a pregnancy in 1897 patient became extremely ill. High fever, rigors. Albuminuria and pyuria.

Date of Operation.	Result.	Remarks.
June 2nd, 1897. Nephrectomy. R. Kidney.	Died June 3rd.	The patient was evidently suffering from septic absorption, after convalescing from her confinement. Nothing to explain this illness could be detected clinically either about the pelvic organs or the fistula, but it was thought advisable to explore the sinus. This was done, and the kidney was removed. The kidney was very friable, and showed numerous small foci of suppuration, which had the distinction of an ascending nephritis. Microscopically, the specimen showed acute diffuse nephritis. No P.M. was obtained. This kidney had the same morbid characters as that in Case 4 in this table. The opposite kidney was most likely in the same stage.

TABLE IX.—OPERATIONS FOR

PERFORMED BY

A. Retroperitoneal tumour connected with kidney.

A.

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1897	1	Mrs. B.	Female.	71	Lump noticed for a few days in right side of abdomen. Some symptoms of constipation and vomiting had suggested the possibility of intussusception.

B.

1893	2	Mrs. C.	Female.	37	A large painful swelling in left side of abdomen.
1893	3	F. T.	Male.	21	Large, rapidly growing tumour.

TUMOURS OF THE KIDNEY.

MR. HENRY MORRIS.

B. Cystic disease of kidneys. **C.** Malignant disease of kidneys.

A.

Date of Operation.	Result.	Remarks.
Nephrectomy. June 12th, 1897. R. Kidney. Excision of a large perirenal lipoma.	Recovered.	On April 15th laparotomy was performed, and a retroperitoneal tumour connected with the kidney was found. On June 1st the tumour and kidney were taken out through a lumbar incision. The bulk of the tumour shelled out well, but a large part of it was very adherent to the top of the kidney. It was found impossible to remove the tumour without also removing the kidney. The tumour proved to be a large retroperitoneal lipoma. March, 1898.—There are indications of a recurrence, though patient is well and free of pain.

B.

Nephrectomy. July 2nd, 1893. L. Kidney.	Recovered.	The kidney was polycystic, and was removed. Wound healed well, but later on symptoms appeared in the other kidney. (For second operation, *v.* No. 4.)
Nephrectomy. Aug. 18th, 1893.	Died Aug. 20th	Nephrectomy by lumbar and transperitoneal method. Suffocated from vomit from acute dilatation of stomach 48 hours after operation. The kidney was one of congenital cystic disease. No P.M. allowed.

B. (*continued*) :—

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1893	4	Mrs. C.	Female.	37	Swelling, which was very painful, in region of right kidney. Left kidney had been previously removed.
1894	5	Mrs. F.	Female.	43	Noticed a lump in right side of abdomen since Nov., 1893. Quite painless. A movable, rounded, lobulated swelling.
1898	6	E. C.	Female.	34	In Nov., 1897, a swelling was first noticed in the left lumbar region. There was some pain in the loins, but not very acute. Attacks of biliousness and vomiting have been frequent. There was a large swelling of reniform shape in the left loin. No tenderness. No albumen.
			C.		
1885	7	H. S.	Male.	51	Swelling and hardness in right hypochondriac region noticed for 6 months. Occasional pain. A large, firm, rounded swelling movable with respiration was felt.
1886	8	Mrs. D.	Female.	70	Subject for some years to bilious attacks and pain in region of gall bladder. Pain got more constant and was obliged to take to bed. A tumour had been noticed in right side of abdomen for 2 years, and was getting larger. Progressive loss of flesh.

B. (*continued*) :—

Date of Operation.	Result.	Remarks.
Nov. 9th, 1893. Cysts punctured in R. Kidney.	Recovered.	The right kidney was found to be in a condition of polycystic disease. Two large cysts were punctured and the tension relieved. The left kidney had been previously removed—*v.* No. 2 in this table. Subsequently died from extension of the disease.
Nephrectomy. May 3rd, 1894. R. Kidney.	Recovered.	Kidney excised by Langenbuch's and lumbar incision. The opposite kidney examined, and found normal. Rapid recovery. Was quite well in November, 1897. The tumour was a polycystic kidney. Is well to-day.
Nephrectomy. Feb. 21st, 1898. L. Kidney.	Recovered.	A large polycystic kidney was found and removed. The ureter was catheterised, and found to be very small in diameter. Three inches of the ureter were removed with the kidney. Is quite well, and passing nearly normal quantity of urine of good specific gravity.
	C.	
L. Nephrectomy. April 14th, 1885.	Died April 15th.	A large sarcoma of the suprarenal body was found and excised, with the kidney attached to it. (*V. Brit. Med. Journ.*, vol. i., 1893, p. 2, for illustration of tumour and report of case.)
Nephrectomy. April 15th, 1886. R. Kidney.	Died in 18 hours from shock of operation.	Kidney removed through Langenbuch's incision. The kidney was enlarged to three or four times its natural size. The growth was a sarcoma with numerous cysts. (*V. Brit. Med. Journ.*, vol. i., 1893, p. 2, for illustration of tumour and report of case.)

C. (*continued*) :—

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1888	9	Mr. G.	Male.	55	Tumour in the right loin.
1889	10	Miss D.	Female.	37	Pain and constipation for 8 months, followed by discovery of a tumour.
1892	11	Mr. C.	Male.	43	Hæmaturia for 2 years. Progressive emaciation. Pain first came on in March, 1892, and a tumour was then discovered. The liver was also enlarged.
1894	12	Mrs. C.	Female.	57	A rapidly growing tumour in left hypochondrium noticed for a few weeks. It is movable and elastic. No pain or tenderness.

C. (*continued*) :—

Date of Operation.	Result.	Remarks.
Nephrectomy. March 18th, 1888 R. Kidney.	Recovered.	The right kidney was infiltrated with cancerous growth. It was removed together with the adjacent masses of cancer. New growth could be felt spreading across the spine, upwards behind the liver, and down into pelvis. Recovered from operation, but died in following June. (*V. Brit. Med. Journ.*, vol. i., 1893, p. 2, for illustration of tumour and report of case.)
Nephrectomy. Oct. 15th, 1889. R. Kidney.	Recovered.	The kidney was removed by lumbar and lateral abdominal incisions. The tumour proved to be a sarcoma of the kidney. The patient subsequently died from malignant disease of the ovary and liver in summer of 1892. (*V. Brit. Med. Journ.*, vol. i., 1893, p. 2, for illustration of tumour and report of case.)
Nephrectomy. May 31st, 1892. R. Kidney.	Recovered.	Langenbuch's incision. The liver was found studded with white nodules of new growth resembling cancer. The renal tumour, however, was freely movable and easily shelled out, so it was removed. He recovered rapidly, was relieved of his pain, and was living 8 months after. The tumour proved to be one of the supra-renal capsule, which had encroached upon and absorbed the upper part of the right kidney. Its structure resembled the medullary part of the supra-renal capsule. (*V. Brit. Med. Journ.*, vol. i., 1893, p. 2, for illustration of tumour and report of case.)
March 28th, 1894. L. Kidney.	Recovered. Died since of recurrence.	A large cyst projected from upper end of kidney, and was with difficulty peeled away. The kidney was full of small cysts containing gelatinous material, and was found on microscopical examination to be sarcomatous.

C. (*continued*):—

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1894	13	Mr. B.	Male.	54	In Nov., 1893, commenced to pass clots of blood, and on one occasion had retention for a short time. Lost flesh rapidly. A large movable tumour in the right loin. No pain. Some white flakes in urine and slight albuminuria, but otherwise natural.
1897	14	G. D.	Male.	9 months.	Abdomen large since birth, and a definite tumour noticed a month before admission.
1898	15	Mr. D.	Male.	41	Hæmaturia at intervals of 3 or 4 months for 2 years. No pain. Swelling in right loin detected only 1 week. Losing flesh, and hæmaturia becoming more severe.

C. (*continued*):—

Date of Operation.	Result.	Remarks.
Sept. 13th, 1894. Nephrectomy. R. Kidney.	Recovered. Died since of recurrence.	Kidney freed from its surroundings by incision into loin, and afterwards extracted through a second incision along right semilunaris. The left kidney was healthy. The right kidney was found to be the seat of diffuse sarcomatous growth.
May 17th, 1897. R. Nephrectomy.	Died within a few hours of shock, May 17th.	Incision in semi-lunar line. The pedicle of the tumour ligatured and the tumour removed. It was found to be a sarcoma with secondary deposits in the retroperitoneal and mesenteric glands.
Jan. 20th, 1898. R. Nephrectomy.	Recovered.	Incision in right linea semilunaris and diagnosis verified. Through right lumbar incision posterior connections detached. Nephrectomy completed through anterior incision.

TABLE X.—OPERA-

PERFORMED BY

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1887	1	T. G. W.	Male.	32	Four months before admission he had been run over by a van, and was in a hospital for 3 weeks with one rib fractured and supposed internal injury, but no swelling was found. On taking a walk the day before admission he was seized with severe pain in right side of abdomen, passing down the thigh. Vomiting and shivering also occurred. A large fluctuating swelling was found in right side of abdomen, which was increasing in size.
1889	2	T. G. W.	Male.	34	Admitted for swelling in right loin, which came on after a urinary sinus in the loin had closed. The sinus was the result of an operation after rupture of renal pelvis. (*V.* No. 4.)
1893	3	T. L.	Male.	33	No definite history of an injury could be obtained, but there had doubtless been one to the left side. Had been confined to the house for 5 weeks on account of general debility and pain in the left side extending to the groin. A large tumour was felt occupying the left flank and left side of abdomen.

IONS FOR INJURY.

MR. HENRY MORRIS.

Date of Operation.	Result.	Remarks.
Exploration. Oct. 27th, 1887 R. Kidney.	Recovered.	The kidney was explored through a right lumbar incision. As the transversalis fascia was being examined, it burst, and 100 oz. of blood-stained fluid escaped. A large rent was felt in the renal pelvis. A drainage-tube was put into the wound, but not into the kidney. Recovered with a fistula. The kidney was twice explored in 1889. (*V.* Nos. 2 and 4 in this table.) (See *Edinburgh Med. Journ.*, Jan., 1898.)
Exploration. June 1st, 1889 R. Kidney.	Recovered.	The old scar was reopened. Kidney could not be definitely distinguished, the man was very stout, and all the tissues in the loin had been very much altered by inflammatory changes. A drainage-tube was inserted into the track of the old sinus. In July, 1894, the sinus was still open and a little fluid escaping; but the sinus finally closed. (For previous operation, *v.* Nos. 1 and 4, and *Clinical Journal*, Aug. 1st, 1892.)
Nephrectomy. July 8th, 1893. L. Kidney.	Recovered.	After dividing the muscles the lumbar fascia bulged considerably into the wound, and as soon as it was incised a quantity of extravasated blood escaped. About 4 pounds of blood-clot was removed from an extensive retro-peritoneal space, in addition to a large quantity of black treacle-like blood. The source of the hæmorrhage had been a deep rent in the anterior surface of the lower half of the kidney. Kidney was removed and wound healed well. Patient wrote on Nov. 23rd saying he was feeling better than he had done at any time during recent years. (*V. Clinical Journal*, Aug. 1st, 1894.)

Year.	No.	Initials.	Sex.	Age.	Leading Symptoms.
1897	4	T. G. W.	Male.	42	A fresh abscess formed, and was opened through the old scar; this did not heal up, and patient requested another operation.

Date of Operation.	Result.	Remarks.
Ureterectomy. Nov. 15th, 1897. R. side.	Recovered.	A long, curvilinear incision was made as for nephro-ureterectomy, and a most careful and thorough search instituted for the kidney, but only a flattened, fig-shaped mass of fibrous tissue was found in its place. The ureter was found and traced nearly up to this mass. It was a very slender tube, and quite closed at its renal end. As a little traction was being made on the ureter, it tore from its connection. The patient made a good recovery. (*Edinburgh Med. Journ.*, Jan., 1898.) (For previous operations, *v.* Nos. 1 and 2.)

TABLE XI.—COLLECTED CASES

CASES

Year.	No.	Author.	Sex.	Age.	Duration and Course of Anuria.
1870	1	**GUERMONPREZ.**	—	—	Anuria.
1882	2	**BARDENHEUER.** (Quoted by Theleu.)	Female.	27	Complete anuria for 2 days.
1884	3	**H. MORRIS.**	Female.	55	Gradual onset of anuria for 6 months, which was complete for 6 days before death.
1885	4	**LUCAS.**			
1885	5	**MOLLIERE.**			
1886	6	**LANGE.**			had been performed on the left.
1886	7	**ISRAEL.**	Female.	50	Anuria for 6 days.

ERRATUM.

[illegible] results in cases numbered [illegible]

)F CALCULOUS ANURIA.

)PERATED UPON.

Operation.	Result.	Remarks.
Lumbar nephrotomy.	Died on 3rd day.	Enormous dilatation of left kidney owing to a stone blocking the ureter. *The right kidney was absent.* (Guermonprez — *Soc. Medico-Clinique de Lille*, 1870.)
R kidney explored and ureter incised and fixed to the wound, making a permanent fistula. Calculus extracted from upper end of ureter.	Recovered.	The left kidney was destroyed by suppuration secondary to cystitis. (*Centralbl. für Chir.*, March 25th, 1882.)
The obstruction was detected at lower end of ureter when the bladder was being digitally explored.	Died.	The impacted calculus could not be dislodged by means of the finger in the bladder, and no more extensive operation could be performed at the time, and the condition of the patient did not allow any subsequent operation.
Nephrotomy. Exploration of kidney, and extraction of a calculus from the pelvis which was obstructing the ureter.	Recovered.	The patient was in good health 5 years after the operation. (*Lancet*, 1891, i., p. 144.)
The renal pelvis opened across the kidney by thermocautery.	Recovered.	(*Lyon Médicale*, 1885, p. 207.)
R. kidney explored, and some concretions were found impacted in the upper part of the ureter and removed.	Died on 3rd day after operation.	(*Medical News*, Jan. 16th, 1886.)
Pelvis incised and stone extracted from upper end of ureter. A second calculus was also found in ureter below the other and extracted.	Recovered with fistula.	(*Berl. klin. Woch.*, 1886, p. 870.)

Year.	No.	Author.	Sex.	Age.	Duration and Course of Anuria.
1887	8	**PARKER.**	Male.	13	Complete anuria.
1887	9	**BERGMANN.**	Male.	54	Complete anuria.
1887	10	**CECI.**	—	—	Anuria.
1888	11	**CHAMPIONNIÈRE.**	Female.	42	Anuria for 13 hours.
1888	12	**ISRAEL.**	Male.	49	Anuria for 5 days, in the course of renal colic.
1889	13	**RALFE & GODLEE.**	Female.	26	Anuria for 53 hours after left renal colic.
1889	14	**H. MORRIS.**	Female.	63	Total suppression of urine for 9 days before operation. The attack occurred immediately after running indoors on the onset of a thunderstorm. Attack consisted of pain in right side and suppression. Previous colic on left (?) side, but date uncertain.
1889	15	**KIRKHAM.**	Male.	58	Anuria for 5 days. Calculus in ureter felt just above the point where it crosses the external iliac artery.
1889	16	**TORREY.**	Female.	43	Signs of uræmia during course of a pyonephrosis of left kidney.

Operation.	Result.	Remarks.
Right lumbar incision. Death from uræmia.	Died.	Calculous condition of R. kidney with a little gravel in the ureter. Left kidney disorganised. (*Royal Med.-Chir. Soc.*, 1887, p. 253.)
Incision of renal pelvis and extraction of calculus from upper end of ureter.	Recovered.	(Bergmann—*Berl. klin. Woch.*, 1887, p. 777.)
Incision of ureter *through rectum*, and extraction of calculus.	Recovered.	(*Riforma Medica*, 1887. Quoted by Vailhen.)
Incision of kidney by thermocautery. No stone found.	Recovered.	Stone expelled spontaneously after the operation. (*France Médicale*, 1888.)
Pelvis incised. A calculus found obliterating upper orifice of ureter, and another one 10 cm. lower down. Both extracted.	Died on the 9th day.	(*Deutsch. med. Woch.*, 1888, p. 4.)
Incision of ureter.	Recovered.	(Ralfe & Godlee—*B. M. J.*, 1889, p. 474.)
Aug. 29th. Explor. of right kidney.	Died, Aug. 30th.	Kidney of great size and enormously congested. Free incision of convex border, the margins of which were stitched to loin wound. A few ounces of urine escaped, but no stone found.
Ureter incised, stone extracted, and wound sutured. The stone was reached by enlarging the wound in the loin.	Recovered.	(*Lancet*, 1889, Vol. i., p. 525.)
Stone found and extracted at mouth of ureter through a laceration. Kidney and pelvis drained.	Recovered.	(*Amer. J. of the Med. Sciences*, 1889.)

Year.	No.	Author.	Sex.	Age.	Duration and Course of Anuria.
1890	17	**CABOT.**	Male.	60	Complete anuria for seven days. Previous attacks of colic.
1891	18	**H. MORRIS.**	Male.	17	6 oz. of urine passed in 3 days after operation of nephrotomy on right kidney. Impaction of calculus in ureter of opposite side.
1891	19	**TURNER.**	Female.	45	Calculous anuria, with double pyonephrosis.
1892	20	**DESNOS.**	Male.	54	Anuria for 7 days following after frequent attacks of colic for many years.
1893	21	**DUFFAU—LARGAROSSE.**			Anuria for 8 days.
1893	22	**GANGOLPHE.**			Urgent symptoms of anuria.
1893	23	**H. MORRIS.**	Female.	63	Suppression of urine for 6 days before operation. Was suffering at the time of operation from bronchitis and asthma.
1893	24	**LEGUEU.**	Female.	52	Anuria for 7 days. Marked vomiting at onset. Mind clouded towards the end. Previous pain chiefly on right side.

Operation.	Result.	Remarks.
Median abdom. explor. R. ureter appeared normal —left could not be felt. Lumbar incision and explor. of left kidney, but nothing found.	Recovered.	9 gallons of urine were passed in first 24 hours after operation. (*Boston Med. & Surg. Journal.*)
Operation Dec. 2nd. Incision made into convex border of right kidney and 3 calculi extracted.	Died Dec. 4th.	P.M., the right kidney was in an advanced state of pyonephrosis. The *left* was converted into a multilocular sac containing a calculus, and another calculus was impacted in upper part of ureter.
Nephrotomy on both sides.	Died.	(*B. M. J.*, 1891, p. 852).
Nephrotomy. Calculi found and urinary flow re-established.	Recovered.	(*Annales des maladies des organes génito-urinaires*, 1892, p. 410.)
Nephrotomy.	Death.	(*Annales des maladies des organes génito-urinaires*, 1893, p. 77.)
Nephrotomy.	Death 3 days after.	Pyonephrosis on right side, due to calculus. L. kidney was a collection of cysts. (Gangolphe — *France Médicale*, 1893, p. 111. Quoted by Vailhen.)
Oct. 6th, 1893. R. nephrotomy. One calculus and several phosphatic concretions extracted from pelvis and upper end of ureter.	Died 1 hour after operation.	The symptoms before the fatal attack had been attacks of pain in the right loin, accompanied by suppression of urine, bronchitis, and asthma.
Nephrotomy, R. Incision into convex border. Some urine escaped. Several calculi in pelvis, one of which blocked the orifice of the ureter.	Died.	(*Mémoire sur l'anurie calculeuse*, 1895.)

Year.	No.	Author.	Sex.	Age.	Duration and Course of Anuria.
1893	25	**H. MORRIS.**	Male.	63	History of previous passage of a calculus. Oct. 24th, an attack of hæmaturia, followed by partial suppression for 36 hours. On Nov. 2nd suppression again took place, and lasted 5 days.
1893	26	**VERNON.**	Male.	63	Anuria for 3 days following an attack of fever, and pain in loins with pus and albumen in the urine.
1894	27	**HIND.** (Mr. Morris present at operation.)	Male.	55	Suppression for 6 days. Relieved by operation.
1894	28	**DEMONS.**	Male.	28	Anuria for 12 days.

Operation.	Result.	Remarks.
Nov. 7th, 1893, R. kidney explored, and found very large, tough, and hypertrophied. Kidney incised and found to be sacculated, and an ounce or two of urine pent up.	Died Nov. 9th.	After the operation large quantities of urine freely passed through the lumbar wound up to the time of death. P.M., right kidney in advanced state of chronic nephritis and dilatation, owing to previous long-standing partial obstruction in ureter. Left kidney entirely destroyed.
Dec. 31st, 1893, Nephrotomy, R. Kidney.	Died.	The right kidney was incised, and a quantity of foul urine and pus escaped. After the operation there was some improvement for a few days, and much urine was secreted by the wound, and some was passed naturally. Died a week after operation. P.M., suppuration of right kidney, and half-way down the ureter a phosphatic stone was impacted. The *left* kidney was completely atrophied. (*Brit. Med. Journ.*, i., 1894, p. 1304.)
Jan. 9th, 1894, R. nephrotomy and ureterotomy. Calculus found blocking ureter at its upper end, and several small stones in the pelvis were also extracted through the same incision in the ureter. The one blocking the ureter weighed 7 grains. One also removed from kidney substance by incision along convex border which weighed 36 grns.	Died 58 hours after the operation.	Urine freely passed immediately after operation, and continued to death. P.M., left kidney a mere shell, containing 360 grains of calculous deposit. (*B. M. J.*, May 5th, 1894, p. 960.)
Nephrotomy on 12th day.	Recovered.	For 2 months after operation the urine was partly passed through the wound in the loin. A calculus the size of a bean was then passed through the urethra, and after this the fistula rapidly closed. (*Annales des maladies des organes génito-urinaires*, 1894, p. 97.)

Year.	No.	Author.	Sex.	Age.	Duration and Course of Anuria.
1894	29	**POUSSON—DEMONS.**	Male.	43	Anuria for 9 days.
1894	30	**POUSSON.**	Female.	42	Anuria for 4 days.
1894	31	**JOUON AND VIGNARD.**	Female.	32	Anuria for 3 days.
1894	32	**KADIAU.**	Female.	58	Anuria, with uræmic symptoms.
1894	33	**SUTTON.**	Male.	44	Attacks of pain in left lumbar region for 29 years. Occasional passage of gravel and hæmaturia. Sudden attack of pain in right loin was accompanied by anuria. Complete anuria for 72 hours with incomplete anuria (5 oz. passed) for next 24 hours. Refused to be operated upon earlier.
1895	34	**POUSSON.**	Female.	38	Anuria, with uræmic symptoms.
1895	35	**H. MORRIS.**	Female.	35	Incomplete, with intermission, 18 days, followed by complete suppression of urine for 4 days, due to impaction of stone in left ureter.
1895	36	**LEGUEU.**	Male.	6	Anuria for 5 days.

Operation.	Result.	Remarks.
Nephrotomy on 9th day, and some gravel removed from upper end of ureter.	Died.	Urine passed by urethra after operation, but death occurred in 24 hours. (*Annales des maladies des organes génito-urinaires*, 1894, p. 99.)
Nephrotomy on 4th day.	Recovered.	Natural flow re-established on the 7th day after operation. (*Annales des maladies des organes génito-urinaires*, 1894, p. 101.)
Nephrotomy. Incision into the convex border of the kidney. Some pus and urine escaped. No stone found.	Recovered.	A fistula remained. (*Annales des maladies des organes génito-urinaires*, 1894, p. 688.)
Nephrotomy.	Died 8 hours after operation.	Both ureters found obliterated by calculi near their entrance into the bladder. (*Médecine Moderne*, 1894, p. 1076.)
June 24th, 1894, R. Kidney.	Died June 25th.	R. Kidney very congested and a stone found blocking the upper end of right ureter. P.M., calculous pyelitis of the left kidney and obstruction of the ureter by a stone. (*Middlesex Hosp. Reports*, 1894, p. 187.)
Nephrotomy.	Died during operation.	*Thèse Donnadieu*, Bordeaux, 1895. Quoted by Vailhen.)
Feb. 8th, 1895, L. Kidney. Stone extracted from ureter and another from kidney substance. Large quantity of pus present.	Died 2 hours after operation.	This was the third operation. The other two had been performed on the *right* kidney, which had been much diseased by the presence of stones (see Tables I. and II.).
Nephrotomy.	Recovered.	Stone extracted from the ureter and the renal wound sutured. Recovery without a sinus. (*Thèse Donnadieu*, 1895.)

Year.	No.	Author.	Sex.	Age.	Duration and Course of Anuria.
1895	37	**LEGUEU.**	Male.	47	Anuria for 6 days. Subject to colic for many years. No uræmic symptoms.
1895	38	**LEGUEU.**	Male.	54	Anuria for 6 days. Symptoms since 1891. No uræmic symptoms.
1895	39	**LEGUEU.**	Female.	22	Anuria for 3 days. Vomiting a marked symptom. Previous passage of stones.
1895	40	**DURET.**	Male.	43	Intermittent anuria with convulsions on the third day.
1895	41	**H. MORRIS.**	Male.	47	Sinuses resulting from perinephric abscesses, the result of calculi, were explored on June 25th, 1895. No calculus found, nor could the kidney be felt. On the 26th, anuria set in (5 oz. were passed in 24 hours). On the 28th a catheter was passed, but only 2 oz. were drawn off.
1895	42	**PARKIN.**	Male.	56	Anuria for 4 days. Symptoms of calculi in both kidneys for some years. On Dec. 18th he had an attack of pain in left loin, accompanied by total suppression, which lasted for 4 days.

Operation.	Result.	Remarks.
Nephrotomy, R. Incision into convex border. Stone found impacted in orifice of ureter.	Recovered.	A fistula remained. (*Annales de Guyon*, 1895. Quoted by Vailhen in *Thèse, L'Anurie Calculeuse*, 1896, pp. 67, 74, and 76.)
Nephrotomy, L. Incision into lower part of kidney substance. Explor. of pelvis. Escape of some urine and extraction of stone from upper end of ureter.	Died soon after operation.	(*Annales de Guyon*, 1895. Quoted by Vailhen in *Thèse, L'Anurie Calculeuse*, 1896, pp. 67, 74, and 76.)
Nephrotomy, L. Large amount of gravel and some small calculi found. Ureter thickened. Incision along convex border of kidney.	Died on the day of operation.	(*Annales de Guyon*, 1895. Quoted by Vailhen in *Thèse, L'Anurie Calculeuse*, 1896, pp. 67, 74, and 76.)
Nephrotomy.	Recovered.	No stone found. The pelvis was drained and the urine was again passed naturally. (Quoted by Vailhen in *Thèse, L'Anurie Calculeuse*, 1896, p. 18.)
June 28th, Laparotomy.	Died June 28th.	The abdomen was explored, but no calculus could be felt in either kidney. P.M., calculous pyelitis with destruction of the left kidney and chronic parenchymatous and interstitial nephritis of the right kidney. (*Middlesex Hosp. Report*, 1895, p. 178.)
Dec. 22nd, Nephrotomy, L. Kidney.	Recovered.	The kidney was congested, and an incision into the cortex caused profuse hæmorrhage, which required plugging to control it. The pelvis was then opened from behind, and a large conical-shaped calculus removed from the upper end of the ureter. (*Lancet*, Sep. 12th, 1896.)

Year.	No.	Author.	Sex.	Age.	Duration and Course of Anuria.
1896	43	**CHEVALIER.**	Male.	17	Anuria for 6 days.
1896	44	**CHEVALIER.**	Female.	63	Anuria for 14 days.
1896	45	**ISRAEL.**	Female.	48	Anuria almost complete for 6 days. Uræmic symptoms on the 5th day.
1896	46	**ISRAEL.**	Male.	—	Anuria for 6 days.
(?)	47	**DURET.** (Reported by Vailhen.)	Male.	42	Complete anuria for 2 days, which was gradually succeeded by a free flow of urine, but complete anuria again suddenly set in on the 6th day, and lasted till operation, which was performed on the 9th day.
1897	48	**MACMUNN.**	Male.	35	Suppression of urine for 2 days after repeated attacks of colic.

Operation.	Result.	Remarks.
L. Nephrotomy.	Died.	The renal function was restored, but death occurred 16 days after from tuberculosis of the lungs. (Quoted by Vailhen in *Thèse, L'Anurie Calculeuse*, 1896, p. 19.)
R. Nephrotomy.	Recovered.	Gravel found and renal function was re-established. (Quoted by Vailhen in *Thèse, L'Anurie Calculeuse*, 1896, p. 19.)
Exploration of right kidney and ureter.	Recovered.	The kidney was distended, and a stone was found blocking the ureter about 2 cm. below the innominate line. The stone was extracted through pelvis of the kidney and the renal wound sutured. (*Presse Médicale*, April 4th, 1896.)
Exploration of kidney and ureter.	Recovered.	A stone was found tightly impacted at the upper end of the ureter. The kidney was also found to contain stones, which were removed. It was later on proved that there was only one kidney existing in this case. (*Presse Médicale*, April 4th, 1896.)
Exploration of kidney, with negative result.	Recovered.	The kidney was very much enlarged, and no kidney could be felt on the opposite side, and it was thought there was probably only one kidney in this case. (*Thèse, L'Anurie Calculeuse*, by Vailhen, 1896, p. 80.)
Aug. 19th. Both kidneys operated upon. Left kidney explored and small stone felt and crushed, but not extracted. Right kidney opened; stone in ureter, at junction of infundibulum, found and removed. No urine pent up. Renal pelvic ureter not explored.	Died Aug. 26th.	Passed 20 oz. urine day after operation, but less on the next day, and after that there was almost complete suppression till he died. (Unpublished.) Private information.

Year.	No.	Author.	Sex.	Age.	Duration and Course of Anuria.
1898	49	**H. MORRIS.**	Female.	26	Dull aching pains in left loin for more than 2 years. Typical attack of left renal colic in Jan., 1897, followed afterwards by other attacks. These attacks were often accompanied by temporary suppression of urine, which lasted from 2 to 3 days, and occurred, latterly, 2 and 3 times in a fortnight. There was enlargement of right kidney which felt very hard, and was believed to contain a calculus.

Operation.	Result.	Remarks.
Jan. 26th, 1898, L. nephrolithotomy.	Recovered.	Kidney very enlarged and congested. An incision was made in the convex border, and through it a stone was extracted from the renal pelvis. (*V.* Table I., No. 35.)

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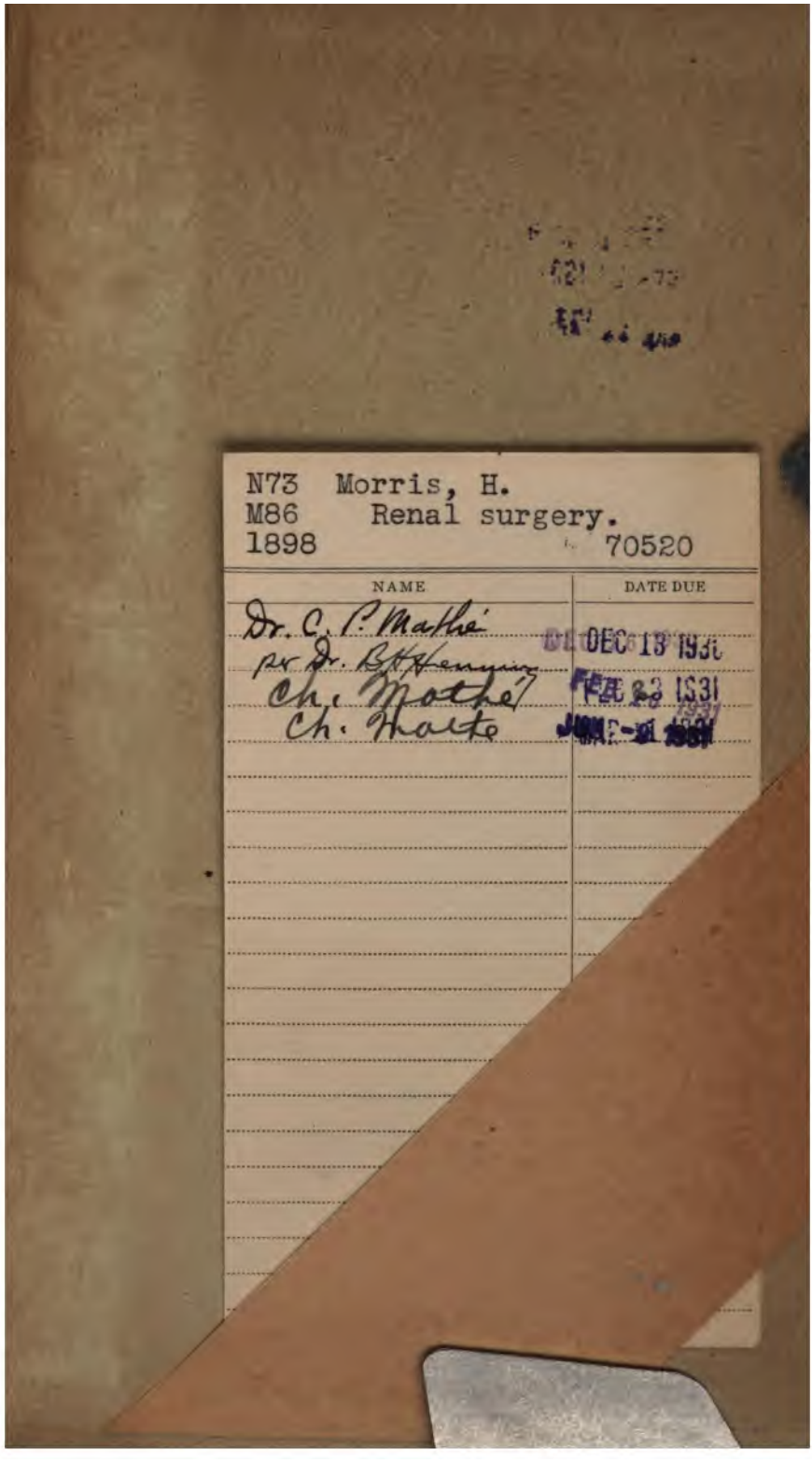
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